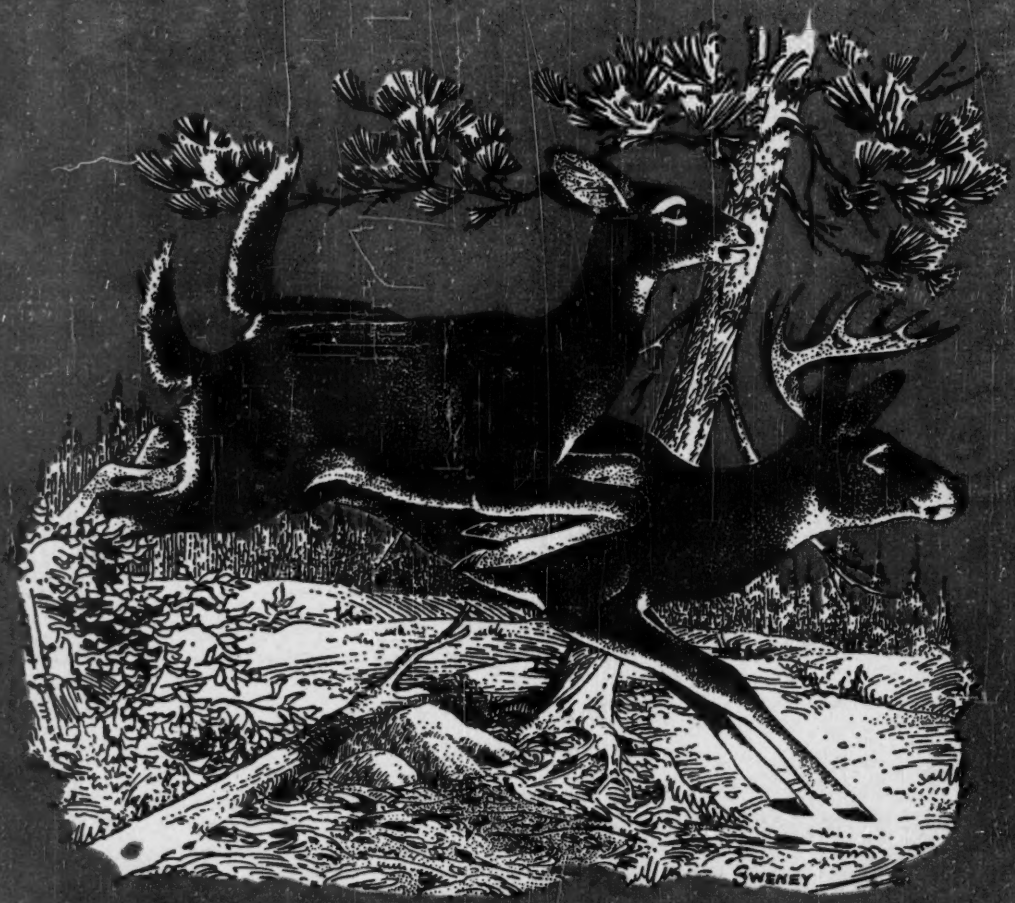
NATURE MAGAZINE



November, 1949 50 Cents Vol. 42, No. 9

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Star Camera Hunting

Skyshooting. By R. Newton Mayall and Margaret L. Mayall. New York. 1949. The Ronald Press Company. 174 pages. Illustrated. $3.75.

The subtitle of this book, which is a volume in the "Humanizing Science Series" from Ronald, is "Hunting the Stars with Your Camera." It is directed to anyone who has a camera and wishes a new photographic experience in photographing the heavens. Practical information is given on how the stars may be trapped on film, both with the use of a telescope and without it. It should be of interest both to amateur astronomers and to camera enthusiasts looking for new fields of activity.

As Einstein Sees It

The World as I See It. By Albert Einstein. New York. 1949. Philosophical Library. 112 pages. $2.75.

This is a new, abridged edition of a little book in which Einstein sets forth his views on life, on the world about him and on his own scientific labors.

Book on Pets

A Pet Book for Boys and Girls. By Alfred Morgan. New York. 1949. Charles Scribner's Sons. 246 pages. Illustrated. $2.75.

This is a book, as the title indicates, that will aid any boy or girl in the proper care of a pet, whether it be a domesticated animal, or some small wild mammal that may in some way need care. Tortoises and turtles, alligators, goldfish, tropical fish, canaries and parrots are also covered.

A Window Plant

The Plant in My Window. Ross Parmenter. New York. 1949. Thomas Y. Crowell Company. 148 pages. $2.50.

The author is a city dweller who inherited from a former tenant a plant that grew in a pot on the window sill. It was not a rare or particularly beautiful plant, and its new owner treated it quite casually at first. Despite relative neglect the plant survived. Its persistence intrigued the author, and sent him to learn about the habits of the plant and its needs. This opened new doors and provided new intellectual stimulus, so this is a charming book of growth, mentally and botanically.

Nests of Birds

Bird's Nests. By Richard Headstrom. New York. 1949. Ives Washburn. 128 pages and illustration. $2.75.

This is a handy pocket field guide and identification manual to the nests of birds of the United States east of the one hundredth meridian. The nests are classified by their location and constituents. The book is an outgrowth of a series of articles on nest identification the author wrote for the Bulletin of the Massachusetts Audubon Society.

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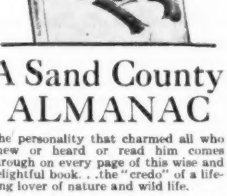

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Nature in Print

By HOWARD ZAHNISER

It has been interesting and delightful recently to have had the privilege of reading, as Nature in Print volumes, two records of travel in Asia, that, in a measure, combine with their outdoor interests the interests of the far away and long ago. One of these, *Abbe David's Diary*, is described in its ample subtitle as *Being An Account of the French Naturalist's Journeys and Observations in China in the Years 1866 to 1869*. As years are numbered these three may not seem so far in the past, but China had then been opened to Europeans only twenty years, and the customs and modes of travel that the French naturalist found are indeed different from our own. Similarly, this other volume, *The Valley of Flowers*, by the British mountaineer and flower collector Frank S. Smythe, although of our own time, describes the culture of Himalayan lands that is of a different world. The Abbe David, in his missionary way, saw little to envy in the China and Mongolia where he collected specimens for the Paris Museum of Natural History, but Mr. Smythe at least felt an indictment of our own system's ills among the "happy and contented people" whom he visited. In spiritual culture these Tibetans "consider themselves superior to Europeans," and Mr. Smythe thinks "the attitude of Himalayan peoples to western progress is best summed up" in the words of a Tibetan who said: "We do not want your civilization in Tibet, for wherever it is established it brings unhappiness and war." Whatever the moral conclusions one may form, however, the exotic interest is high in both these works, and does add to their other and perhaps more important interests.

Abbe David's Diary, as Professor E. D. Merrill of Harvard says in a foreword, "is indeed a little classic in the annals of scientific exploration, and should appeal to all who are interested in travel, in zoology, in botany, and in horticulture." The original French texts, he tells us, have long been out of print, and we thus owe much to the garden author, Mrs. Helen M. Fox, for translating and editing for us this truly charming and informative book. She tells of how this came about in a paragraph that nicely characterizes the book and certainly invites quotation.

"One afternoon in the New York Public Library," Mrs. Fox writes, "while looking up stories of four French missionaries who had discovered and introduced hundreds of plants from China, Tibet, and Mongolia, I came across the travel diaries of Abbe Armand David, a missionary priest and scientist stationed in China from 1862 to 1874, who went on journeys of exploration for the Museum of Natural History in Paris. In these diaries he tells the story of the day-by-day life he encountered. He describes everything he saw and heard, from lamas saying their prayers to the songs of river boatmen, and from the birds flying overhead and the fish swimming in the rivers to the composition of the rocks and the shapes of the mountains he climbed. The style is natural, like written speech — a quality often lost when diaries or letters are revised. The vocabulary is a mingling of scientific and technical terms with expressions derived from a classical and religious education. The whole story is characterized by French clarity, and is enlivened by witty remarks and by the author's enjoyment of the situations. Highly enthusiastic about the diaries, I decided to translate them in order to make these authentic and amusing stories available in English, for the public of today."

Mrs. Fox has, accordingly, translated the diaries of the first two of the three journeys in China, during which the Abbe collected natural history specimens and wrote into a crisp journal his observations and thoughts. In a biographical sketch, which she calls her "personal tribute," Mrs. Fox writes also of the third journey and quotes at some length from it. It is too bad that there is no map in this book, and an index would add ease to its later enjoyments. One mentions these matters reluctantly, however, for so much has been so well done to bring us an acquaintance with this naturalist who discovered so many forms of life new to science and the western world, including the giant panda, and for whom so many forms have been named. These include the dove-tree genus, *Davidia*, and David's deer, an interesting mammal long extinct in the wild, known in David's time only in a Pekin park, and today perhaps known from the herd at Woburn Abbey in Bedfordshire.

Of great meaning to us today, as well as to those who have preceded and those who will follow us, is the regard for all creation that Abbe David seems always to have cherished. He observed the "principle of never killing an animal not needed" for his natural history collections and regretted even this necessity. Writing of pheasants, on one occasion, he described it as "less distressing" to feed himself with only rice or millet "than to kill for the table one of these poor creatures, who revel in life so joyously and do not harm nature, but on the contrary embellish it." He revered St. Francis of Assisi, who "loved animals tenderly and protected them whenever the occasion presented itself," and he himself declared: "How can one help loving the charming creations of the hand of God, in the humblest of which the wisdom and admirable goodness of the Creator are manifested in a manner as marvelous, as astonishing, and as inconceivable in their way as the production and government of the infinite worlds that exist in space!" And again he exclaimed: "I passionately love the beauties of nature; the marvels of the hand of God transport me with such admiration that in comparison the finest works of man seem only trivial." From the third-journey diaries Mrs. Fox quotes in her biographical sketch an (unfortunately) entirely modern plea for conservation: "It is really a pity the education of the human species did not develop in time to save the irremediable destruction of so many species which the Creator placed on our earth to live beside man, not merely for beauty, but to fulfill a useful role necessary for the economy of the whole. A selfish and blind preoccupation with material interests has caused us to reduce this cosmos, so marvelous to him with eyes to see it, to a hard matter-of-fact place. Soon the horse and the pig on one hand and wheat and potatoes on the other will replace hundreds of thousands of animals and plants given us by God." And Abbe David declared a turth that seems of central importance to many of us when he declared: "Progress in civilization should lead us toward greater respect for the works of creation."

Mr. Smythe in *The Valley of Flowers* — a most interesting and inspiring book, one that is often exciting, too, and profound — testifies, nearly a century later than the Abbe to the "greater respect for the works of creation" that has come with such further progress in civilization as we have realized in the meantime. This is a respect that has become the greater for Mr. Smythe, as well as for many others, because of the light that these works of creation throw on the ills that seem so characteristic of our sort of progress.

Man and the Soil

By DANIEL SMYTHE

He talks of stars of earth; fireweed,
And pasture mullein, timothy
Beside the creek, his eye must heed
The dodder painting gold the tree.

And bird and loosestrife, clover, pine,
His farm on valley and wild slopes—
These make the worth of his design;
These are the builders of his hopes.

So let him take his hills, the grass,
Or waters dashing at his feet;
For in his silent way, he has
His hand upon the earth's pulse-beat.

"It is the ugliness man creates that leads to discontentment and war," Mr. Smythe believes, "the ugliness of greed, and the ugliness that greed begets; a vast ocean of ugliness in which he perishes miserably. It is because men are beginning to realize this that they long to escape from an environment of mechanical noises, of noisome fumes and hideous arrangements of bricks and steel into the beauty and quietude of the countryside, to carry themselves naturally on their legs, not artificially on wheels, to travel at God's pace, to listen to the song of Nature, the birds, the streams and the breeze in the cornfield, to look upon beautiful things, flowers, meadowlands and hilltops, to live for a time simply and rhythmically in airs untainted by factory smoke, to discover the virtues of simplicity and good will."

The Valley of Flowers is a record of Mr. Smythe's own realization of such an experience. "This," he writes in his opening sentence, "is the story of four happy months spent among some of the noblest and most beautiful mountains of the world." Returning some years ago (in 1931) from a mountaineering expedition with which he had climbed the 25,447-feet Kamet in the Garhwal Himalayas, Mr. Smythe suddenly found himself in the Bhyundar Valley surrounded by *primulas*. "The Bhyundar Valley," he recalls, "was the most beautiful valley that any of us had seen. We camped in it for two days and we remembered it as the Valley of Flowers." To this valley Mr. Smythe returned in 1937 to spend his four happy months, with four Tibetan porters (of whom he writes at some length and with understanding and interest) and, for part of the time, with another mountaineer who joined him for climbing in these Garhwal Himalayas. Here in this remote part of our world Mr. Smythe collected seeds and specimens of flowers and made photographs, 16 of which in color and in full-page size are a resplendent feature of his report on this beautiful valley.

"The stars," he meditates, "and the hills beneath the stars, the flowers at my feet were part of a supreme Purpose which I myself must struggle to fulfill. Poor little man, from ignoble depths to starry heights, from hilltop to valley in a reckless run; poor, slogging little man, how hard and wearisome the climb, how besetting the winds and difficulties. Surely the hills were made that we should appreciate our strength and frailties? The stars that we should sense our destiny? Yet through all this tangled skein of earthly life must run the golden thread of beauty. Beauty is everywhere; we need not go to the hills to find it. Peacefulness is everywhere, if we make it so; we need not go to the hills to seek it. Yet because we are human and endowed with physical qualities, and because we cannot divorce ourselves from these qualities we must needs utilize them as best we can and seek through them beauty that we may return refreshed in mind and spirit. So we go to seek beauty on a hill, the beauty of a larger freedom, the beauty that lifts us to a high window of our fleshy prison whence we may see a little farther over the dry and dusty plains to the blue ranges and eternal snows. So we climb the hills, pitting our strength against difficulty, enduring hardship, discomfort and danger that through a subjugation of body we may perceive beauty and discover a contentment of spirit beyond all earthly imaginings. And through beauty and contentment we gain peace."

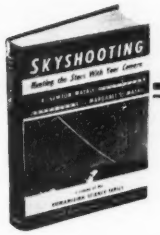
But the climax of *The Valley of Flowers* is the breath-taking and triumphant ascent of Mana Peak. Our author writes:

"But of all my memories, distinct or vague, one memory stands pre-eminent: the silence. I have remarked before this silence of the high mountains. How many who read this have experienced silence? I do not mean the silence of the British countryside or even of the northern hills and moorlands, for though we may strain our ears and hear nothing there is always life not far distant. I mean the silence of dead places where not even a plant grows or a bird dwells. That day there was no wind, not the lightest breathing of the atmosphere, and I knew a silence such as I have never known before. I felt that to shout or talk would be profane and terrible, that this silence would shatter in dreadful ruin about me, for it was not the silence of man or earth but the silence of space and eternity. I strained my ears and heard — nothing. Yet, even as I strained, I was conscious of something greater than silence, a Power, the presence of an absolute and immutable Force, so that I seemed on the very boundary of things knowable and things unknowable. And because I have felt this more than once before on the high mountains I know that death is not to be feared, for this Force is a part of Heaven and a part of us; how else should we be aware of it? From it we have been evolved; into it we quietly and peacefully return."

Abbe David's Diary: Being An Account of the French Naturalist's Journeys and Observations in China in the Years 1866 to 1869. Translated and edited by Helen M. Fox. Cambridge: Harvard University Press. 1949. 302 pp., with foreword by E. D. Merrill, translator's preface including bibliographical information, biographical sketch by the editor, and 17 illustrations from early publications and museum collections (including a portrait) reproduced on 16 plates. $5.

The Valley of Flowers. By Frank S. Smythe. New York: W. W. Norton & Co. 1949. 325 pp., with text-figure map, 16 full-page photographs in color by the author, 4 appendices (botanical notes, list of plants collected, supplementary list of plants, photographic notes), and index. $5.

(*Note to Publishers:* How helpful it would be if the endpapers of such volumes as these could be used for maps!—H.Z.)



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IN THIS ISSUE

November, 1949 Vol. 42, No. 9

White-tailed Deer ..... Fredric Sweney Cover
Nature in Print ..... Howard Zahniser 402
Man and the Soil (Poem) ..... Daniel Smythe 402
Contents Noted ..... R.W.W. 407
The Bear Said "Baw" ..... Frank Dufresne 409
The Dance of Death ..... Rosemary Baxter 412
Nature by Sound and Touch ..... Charlotte Hilton Green 413
"Letter Please," Says the Secretary Bird ..... W. T. Miller 417
"O', Spare that Aged Oak" ..... S. Glidden Baldwin 420
Plants of the Chaparral ..... Lester Rowntree 421
Twin-leaf ..... Walter S. Chansler 424
Birds in Gilded Cages ..... E. Laurence Palmer 425
Yucca (Poem) ..... Daniel Smythe 432
Editorial 433
Eagle Harbor's Deer Citizens ..... Katherine M. Gillette 434
The Basilisk Lizard ..... Alexander F. Skutch 436
The Davie Poplar (Poem) ..... Mattenaya Allegood-Davis 437
So Goes the White-Wing ..... John B. Holdsworth 438
Orchard Wisdom (Poem) Pauline Starkweather 439
Are These Earth's Oldest Plants? ..... Carroll Lane Fenton 440
G.I. Birdman on Honshu ..... William R. Eblen 441
A New Survey of the Heavens ..... Isabel M. Lewis 444
Camera Trails ..... Edna H. Evans 446
The School Page ..... E. Laurence Palmer 448
NABT 450
Under the Microscope ..... Julian D. Corrington 454

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NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3, 1917, and February 28, 1925. $4 a year; foreign $5.00. Additional entry Easton, Pa.

Publication and Editorial Office, 1214 16th Street, N. W., Washington 6, D. C. Additional office of publication, Easton, Pa.

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Snakes

Snakes. By Herbert S. Zim. New York. 1949. William Morrow and Company. Illustrated by James Gordon Irving. $2.00.

This is a book for young people about snakes, their habits and importance in Nature's scheme of things.

A Caterpillar

Sphinx. By Robert M. McClung. New York. 1949. William Morrow and Company. Illustrated by the Author. $2.00.

This is the story of a caterpillar; the story of a year in which a big, gray sphinx developed from an egg to caterpillar, pupa and moth.

Joy in the Garden

The Joyful Gardener. By Agnes Rothery. New York. 1949. Dodd, Mead and Company. 274 pages. $4.00.

This is a book that will charm anyone who has anything to do with a garden, whether actively or passively. It seeks mainly to show what enjoyment may be gotten out of all gardens. Not that there is lack of information of a surprising and fascinating nature in the book, but the pleasant text, with humor and sentiment woven in, makes it a volume primarily for reading. It is, indeed, the ideal gift for a gardening friend.

Conservation Handbook

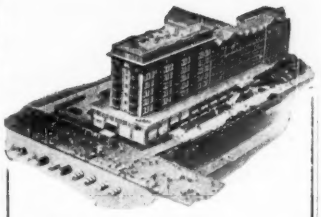
A Conservation Handbook. By Samuel H. Ordway, Jr. New York. 1949. The Conservation Foundation. 76 pages. $1.00.

This little book, published with the aid of the Garden Club of America and other groups, seeks to supply an understanding of terms and concepts in the field of conservation, and about which many people are still uncertain. Mr. Ordway considers conservation and resources generally; discusses the nature of renewable resources, important concepts and approaches; treats with land, forest, range, water and wildlife management; presents the preservation view as exemplified by parks, monuments and wilderness areas. It is essentially a book of definition of phases of conservation, since no exhaustive attempt is made to cover these complicated subjects other than basically. Indeed, the intent of the little book is to serve as a sort of primer of conservation. A glossary of terms often used by conservationists, and often not understood by interested laymen, is provided and is most helpful.

Green Mantle

Britain's Green Mantle. By A. G. Tansley. New York. 1949. The Macmillan Company. 294 pages. Illustrated. $5.00.

This is the story of the vegetative cover of Great Britain, past, present and future. It seeks to present a picture of the native plant life and the influences that operate upon it, good and bad.



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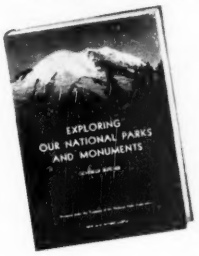

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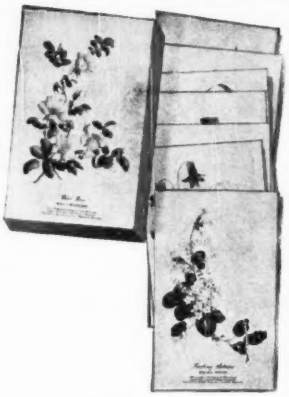

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Contents Noted

ONCE, when we were quite small, and possessor of a new jackknife, we started to carve our initials on a public park bench. Grandmother, who was a wise and wonderful woman, said, "Names, like fool's faces, are often seen in public places." That was all that she said, but she said it, in such a manner that, in the ensuing half-century or so, we have never carved, written or otherwise left our mark in any such public place. Indeed, we recoil with deep-seated distaste at such vain vandalism. And in precisely the same category we instinctively place the proposal to convert Thunderhead Mountain in the Black Hills into a gigantic carved memorial to Chief Crazy Horse of the Sioux. Mount Rushmore is enough of such titanic chiseling — far too much for our taste. There should, no doubt, be a memorial to the Sioux Nation, which fought only to protect that which belonged to it, but such a carving is not such a memorial. Since the threatened mountain is on national forest land the Secretary of Agriculture comes into the matter, and since Indian matters are involved, the Secretary of the Interior is concerned. We can only hope that they had grandmothers as wise as our own.

THERE are some things about wildlife administration that, no doubt, we shall never be able to understand. In the official release setting forth the migratory bird hunting regulations for 1949, there is reference to the mourning dove. One sentence reads: "Investigations have indicated that the population of these birds, particularly in the South and Southeast, has become greatly reduced." Simultaneously comes a release from the Wildlife Management Institute, which speaks for the gunners, quoting the regional director of the U.S. Fish and Wildlife Service as reporting that "Georgia mourning doves now face the most critical season in the state's history." Yet the hunting season for the South and Southeast, including Georgia, is either thirty consecutive days or two periods of fifteen days, and the daily bag limit is ten birds. We would like to have faith in the wisdom and courage of our wildlife administrators, Federal and State, but somehow such examples as this make this course very difficult for us to follow.

AFTER extensive hearings and discussions between Federal agencies, the Chief of Engineers and the Secretary of the Interior agreed to drop the proposal for the erection of Glacier View Dam, a project that would flood an important and valuable part of Glacier National Park. It seemed as though reason had prevailed; that, in this case at least, recognition of something besides kilowatt hours had been established. Now comes Representative Mike Mansfield of Montana with H.R. 6153, a bill that brings the Glacier View Dam proposal back to full vigor. The bill would authorize and direct the United States Army Engineers to proceed immediately with this project. The measure has been referred to the Committee on Public Works of the House and conservationists have the fight to fight all over again.

AT ONE of the sessions on wildlife at the recent UNSCCUR gathering at Lake Success (commented on in this issue on our editorial page), extended discussion was devoted to problems of maintaining and increasing the supply of game birds and mammals. Much attention was given to the effects of predators, gunning pressure, introduction of exotic species to replace depleted domestic stock, licensing of gunners, provision of adequate shooting opportunity, and such. Finally one of the participants raised his numbered card for comment. He said that he had been listening with interest to all the discussion, but wondered whether any thought was ever given to that large segment of the population that happens to like to study, photograph, or just plain see native birds and mammals in their natural habitat. This inquiry brought the response from our country's leading wildlife administrator that, "perhaps unfortunately," wildlife administration was largely dependent upon money from hunting licenses, and that, therefore, gunner interest was given first consideration. Later we discovered that the inquirer was an Egyptologist with an interest in wildlife for wildlife itself. He had, however, pointed his finger at the greatest inequity in our national wildlife attitude. It is a basically unsound situation, as we have repeatedly pointed out in these pages, and we were at least pleased to hear that the present procedure is "perhaps" unfortunate.

WITH what we trust is pardonable pride we quote from *The Cattle Digest*, edited and published in Montgomery, Alabama, by Hiram J. Herbert: "When DDT first became commercially available, and still was pretty much of a war secret, the constantly-accurate Nature Magazine editorialized a warning: the world would live to regret the wholesale, irresponsible slaughter of insects, pointing out that DDT would kill fish and certain birds, therefore might cause havoc with humans, and doubtlessly would upset the biological balance of things to a disastrous end. Since the fact now is very well established that poisons capable of killing insects also can kill humans certainly credits Nature Magazine's editor with being, at least, conservative in his helpful warning." Thank you, Mr. Herbert, who goes on pertinently to say "that, although some 30,000 pesticides have been placed on the markets for sale to the public since the war, nothing in the law governs these deadly agents with reference to the protection of human beings." This is only too true, and we are fearful of the long range dangers inherent in these "miracle" chemicals so blithely accepted because of their spectacular performances. R.W.W.

"The small eyes, like two hot, bright marbles in the broad yellow face, searched along the cliff, coming higher all the time until at last they settled squarely on us."

The Bear Said "Baw!"

By FRANK DUFRESNE

Illustrated by Clarence Tillenius

NEITHER of us saw the bear come on stage. We looked up from the salmon pool and there it was in full view, probably the largest grizzly in the world. Well out from the curtain of green spruces, the yellow-tipped monster was swaggering along a parallel ridge top as though it owned the country. Its enormous, dish-faced head was swinging loosely from side to side with every forward reach of the ham-sized forepaws, the high-humped shoulder fur rippling in the afternoon sunlight. It was a sight to lock the breath in a man's throat.

Out of the corner of my eye I saw Hank stiffen. Then came his tense whisper. "That's the big fellow I was telling you about. That's the biggest bear on all the Kenai."

It was more than that. If it was the greatest on the Kenai, it was the greatest on earth. Once, a long time ago, this bear had shared honors with the famed Golden Bear of California, but when the ranchers wiped out *Ursus magister* it left the Kenai Alexander grizzly as the mightiest of all the species.

The bear shuffled to a stop before a ten-inch cottonwood, looked out over the valley for a moment, then reared to its hind feet. Standing nearly twice as tall as an average man, it swung its broad back against the trunk. The tree top swayed violently as the bear scrubbed its hips and shoulders against the rough bark. "Baw!" it said, not in anger but rather as a groan of comfort. Still upright, the huge beast swung around to face the tree. Its mood seemed to change. Suddenly the big head turned sideways and the yellowed fangs ripped loose a section of the bark.

"Watch this," whispered Hank again. "You'll see something. The big fellow is putting his trademark on the tree. He's posting the property against all others of his kind. I've seen his brand before. It's the highest bear scratch in the country."

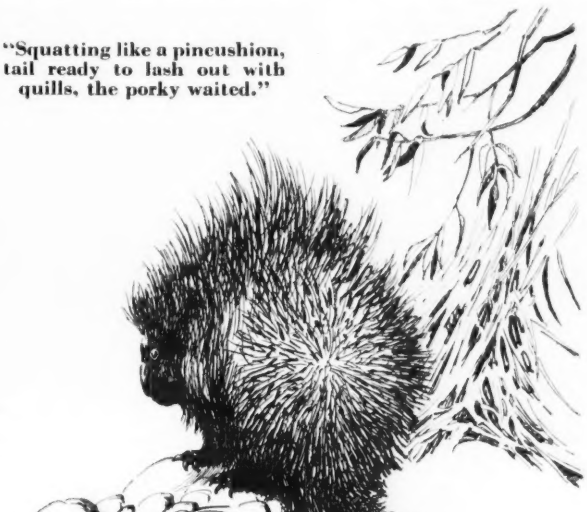
Two mighty forearms were extended. The creature, which looked like something out of the Ice Age, lifted its half-ton bulk on its toe pads as high as it could reach, laid its hooked claws against the trunk and raked downward, the gray bark shredding away to expose the white wood. "Baw-w!" said the bear, and this time it was a menacing, challenging rumble deep out of the belly. "BAW-W-W!"

The grizzly pivoted away, dropped heavily to all fours and started down the last short incline to the valley bottom.

From our seats in the first row balcony, guide Hank Lucas and I watched the heavy of the outdoor performance make its entry into the act. It had been a great show, even without the bear, although possibly a little on the quiet side. Maybe it needed a swashbuckling villain to terrify the cast. Anyway, we now had one; the most powerful brute in all the land.

With our backs propped against a couple of thick, scrubby willows, feet braced between the gnarled roots to keep us from sliding off into space, Hank and I had been observing the Kenai cavalcade from the edge of a rock spur some 200 feet above the valley floor. The guide had told me about this observation point while on a trout-fishing trip along the lower river. So, although it was too early in the season for hunting, we decided to give the rainbows a rest for the day. The climb was worth it. Before us like a vast amphitheatre was the willow-grown bowl formed by bare-topped ridges that rose from the bottomland, tier upon tier, to a semi-circle of snow-capped peaks stacked like stage scenery against the sky.

In the center of the bowl, scarcely a hundred yards away, rested a tremendous bull moose chewing its cud with measured dignity, its big ears fanning away the



"Squatting like a pincushion, tail ready to lash out with quills, the porky waited."

midges. Across the back of the dark neck palmated antlers, still in August velvet, spread wider than a man might stretch his arms. The bull was half asleep although occasionally turning its banjo-shaped muzzle in the direction of the river, where a cow with twin calves were all but hidden among the alders. Come another full moon and the big bull, eyes red with the madness of rut, would be courting this awkward lady, but now there was only a mild interest.

From our perch on the brow of the rock cliff Hank and I had only to lean forward to trace the flow of the river from its birthplace in the high glaciers, down through the canyons and past the alders where the moose cow and calves fed. Downstream a few feet the river bent around the foot of the ledge directly below us. Here the stream, clear as liquid glass, spread thinly over a gravel bottom, and in the shallow pool Hank and I had been studying the strange way of fishes. They were big fish, most of them close to four feet in length; big fish in their wedding colors of orange-red. They were king salmon up from the turbid salt waters of Cook Inlet to lay their eggs and die — some by violence, some by natural process that coated them with deadly fungus during the first spawning.

Urged on by head-butts of the hook-nosed males, the females were pounding their scarlet sides on the bottom, each spasm liberating a few pink, pea-sized eggs. Eager as any lover then, the males finned forward over the bed and we could see their bodies shudder vigorously to extrude the white milt. Then the males dropped back to rest for a few moments before prodding their mates into action again. The process went on, endlessly it seemed, and save for schools of Dolly Varden trout dashing in to seize such eggs as did not immediately settle on the bottom, the scene was one of wild tranquillity.

". . .the grizzly stood with cocked head watching the little fellow jet-propel itself to a pin point across the valley."

But the big grizzly changed all this in a hurry.

First of the animals to sense the golden monarch was a yearling black bear. For an hour or more it had been feeding on a low slope, its brown muzzle buried in a patch of blueberries. At the loud bawl of the grizzly king the little bear threw its nose into the air, sniffing desperately in all directions. Then it made the wrong move.

Maybe it was not funny, but we thought so at the time. Our balcony seats gave us a perfect view of both animals, and of the willow thicket between them, through which neither animal could see. Into this dense cover the frightened black bear scuttled. If the big bear knew what was going on it gave no sign but plodded stolidly down the game trail that skirted the near edge of the willow patch. Then it stopped.

Hank and I saw the bushes bending where the little bear, not knowing when it was well off, came churning through the thicket to burst into the clear just ahead of the grizzly. We could almost read the big fellow's thoughts. Its jaws snapped open, and the sound that floated up to our rock perch was like a locomotive blowing off steam.

"WHUFF!"

That was all; just one explosive snort. But it sent the small bear rolling like a black, furry ball. Somehow, in its terrified gyrations, it traded ends and went shooting out of there, hind feet combing its ears, while the grizzly stood with cocked head watching the little fellow jet-propel itself to a pin point across the valley.

When we brought our eyes back from the fading black comet, the cow moose and twin calves had likewise evaporated from the scene. Three ridge tops away the big bull trotted up into sight, looked back for ten seconds, then took off again at a mile-eating pace. It had not taken the grizzly tyrant long to clear the valley of wildfolk. Or most of them.

Perhaps the porcupine was too dumb. Perhaps there was nothing else it could do. When the trails of the two animals crossed at the foot of the slope the porky bristled, started to waddle away, thought better of it, and stopped. Squatting like a pincushion, tail ready to lash out with quills, the porky waited. It was a silly situation. With one blow of its paws the grizzly could have mashed the porcupine into a squishy door mat. But it ambled on by without a glance at the quill pig. It had come down out of the crags for another purpose.

That purpose lay directly down between our feet. High in the mountains the great bear had sensed the presence of migratory fish in the spawning stream, and, following an instinct bred in his kind for

centuries, the shaggy beast had come down to fill his paunch with the red flesh of salmon. At other times of the year it had grazed on the green sprouts of grass; it had killed the lambs of white mountain sheep and goats. Many a moose calf had gone down before the crushing blows of its paws. All through the summer its five-inch claws had raked the shrilly protesting hoary marmots out of their dens, and, like the smaller black bear, the brass-colored giant had fed on the carrion of winter-killed moose, the pungent roots of hellebore and skunk cabbage, grubs from underground hornets' nests, and the sweet fruit of the alpine berry bushes. But when the salmon moved into its valley the grizzly found its choicest fare.

We were in plain sight, Hank and I, and although our forest-green clothing blended into the willows at our back a binocular-visioned mountain sheep, or a human, would have spotted us instantly on the rimrock. But when the small eyes of the great yellow bear swept across our observation place they gave no sign of recognition.

"Good thing for us our scent curls upward," said Hank. "The big fellow mostly depends on his nose. No quick move to catch his attention, chances are he won't see us." Then he added quietly: "But it's pretty close."

Apparently no salmon had worked their way above the pool at the bottom of the rocks. A hundred yards or so upstream the grizzly pushed through the alder screen to the bank and for a few moments stood stock still studying the water. Then it dropped into a riffle and started wading downstream along the far bank, seeing nothing to interest it until it came to the bend below us. Even then the salmon must have spotted the bear first because all spawning activities ceased and the red fish finned warily in the slight current of their stream.

"Three ridge tops away the big bull trotted into sight, looked back for ten seconds, then took off at a mile-eating pace."

We looked down on a back that seemed to be as big as a haystack. "Man, what a bear!" mumbled Hank. "He looks even bigger than the last time I saw him. Twenty years on the Kenai — I've never seen his match. Man, you're seeing something."

The huge grizzly looked slow, almost ponderous, viewed from topside. That made its next move all the more surprising. Half rearing on its hindquarters for a better look, the monstrous hulk suddenly smashed into the pool amid bursts of spray, geysers of water splashing higher than its head at every jump. Batting the surface with its front paws the grizzly sent the king salmon fleeing in all directions. It seemed a crazy thing to do, but when I whispered my opinion to Hank he smiled.

"Plenty smart, that big fellow. Watch sharp now. You'll see."

Several of the red fish streaked downstream out of the pool, although most of them rushed pell mell up and down along the bank, their backs half out of the water. One grounded itself for a second in shallow water, and the jaws of the grizzly snapped shut on it like a steel trap. It was a sizeable king salmon, weighing probably a good thirty pounds, but dangling in the mouth of the giant bear it looked no bigger than a goldfish dunked out of a glass bowl by the family cat.

Back from the water's edge blue lupines covered the

gravel bar, and into this bed of wildflowers the grizzly carried the salmon. Placing one heavy paw on the head of the fish, the bear gripped the skin near the gills and ripped it free to the tail with one yank. Flat on its stomach, the grizzly chewed the quivering red flesh on one side, flipped the salmon over on the other side to repeat the process. When only skin and skeleton remained the big fellow rose to its feet to face the river again, its appetite still unsatisfied.

It was at this juncture that Hank gave way to an impulse. The same thought had been in my mind for some time, but I had managed to control it. Cupping his hands to his mouth, Hank let go with a deep "Baw!"

"That's what the bear is supposed to say," I objected.

"Don't worry," said Hank. "He'll say it."

At the sound from above the grizzly seemed all at once to blow itself out like a balloon. Its increase in size was astonishing. The rounded ears cocked forward, then laid back flat against the head. The small eyes, like two hot, bright marbles in the broad yellow face, searched along the cliff, coming higher all the time until at last they settled squarely on us. This time they did not pass by, but burned into us with searing hate that raised the hair under my hat. Then from the open mouth came the most blood-chilling roar I have ever heard. The valley seemed to echo with the frightful noise. It was terrifying with menace; a series of blasts unlike any other sound.

Hank's bolt action rifle with its 225 grain slugs had been lying on the ground within easy reach all the time, although I knew he had no intention of using it. We were in no immediate danger, yet the knowledge that Hank would shoot only in defense — that he would draw bead on the "big fellow" only when it was heading our way in a final charge — kept lifting the hackles on the back of my neck.

The roars subsided finally as we remained rigid on our rocky perch. The grizzly, with hairs raised on end along its back from neck to rump, legs stiff as ramrods, eased its bulk into a heavy clump of alders that grew back along the bottom of the rock spur. Strain our eyes as we could, we saw no further sign of its movements. All was still now, and in the dead silence the grizzly seemed more terrible than when it had been in sight and roaring.

"What's it up to now?" I asked, suddenly realizing that I had become allergic to this pet of Hank's.

"Don't ask me," answered Hank. "Nobody knows what a grizzly will do next." He stood up. "But I'll lay you two to one that the big fellow will be up here before long to find out what bothered him."

"That's what I think," I said, "and it gives me an idea — a very good idea. Do you remember the way that little black bear made a flying exit out of here a few minutes ago?"

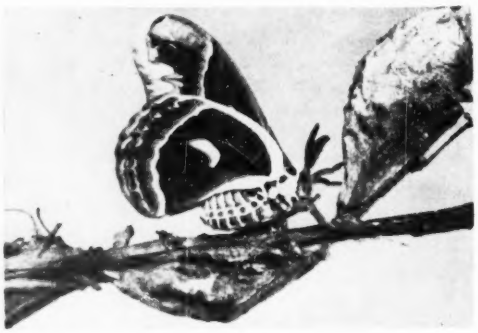
Hank grinned. He picked up the rifle. "We got the same idea," he said casually as he started away. "Let's us go see where that little black bear went."

★

The Dance of Death

By ROSEMARY BAXTER

Photograph by John Baxter



At last! The first of our Cecropia moths had emerged from its cocoon. For two days he rested on the curtain, taking flight each night at eight o'clock and flying, at the most, only twenty or twenty-five minutes.

Then, on the third night, it was my privilege to witness a strange and, somehow, sad thing. Just at dusk, the still beautiful moth fluttered to the floor and began what can be described in no other way than a dance. Rearing up on his abdomen, he fluttered his wings rapidly. His front legs moved in time with his wings, and the deep red hairs on his thorax were raised.

Thinking the moth did not have the strength to fly back to the curtain, I tried picking him up on paper to transfer him there, but each time he would fall back to the floor and go on with the dance. I was afraid he would be stepped on in the living room, as my two girls were much interested, so I moved him to my bed. I hoped that in the dark room he would calm down. My hopes were in vain. As I sat reading, I could hear the fluttering of his wings.

When I brought the insect back to the living room before retiring at ten, he fluttered behind a chair, still dancing. My husband came home from work at midnight and found the moth nearly exhausted, his wings tattered and his beautiful colors almost gone. Not being able to find any other explanation, we could only call it a "Dance Of Death," which surely it was.

Boys and girls who lack the sight to see the birds and to identify them by their size, color and flight listen to bird song records, carefully treasuring the songs so that they may compare them with the calls of the birds that they hear in the wild.

Nature by Sound and Touch

By CHARLOTTE HILTON GREEN

Photographs by Lewis Watson

"THERE's my bird singing now," said one of the blind children seated in my garden. The photographer was arranging a group picture as they listened intermittently to the Cornell bird song records. We had moved the machine out to the bird-bath garden, playing records, then letting the children listen to the birds singing in garden, meadow, or nearby woodland. Cardinal, brown thrasher, catbird, mockingbird, wood thrush, summer tanager, indigo bunting, field sparrow, chippy, Carolina wren, titmouse, chickadee, Maryland yellowthroat, yellow-breasted chat, bob-white — all put on a Birdland Grand Opera for us.

Here were the children of Miss Margaret Watson's sixth grade — and a few of her Scouts — of the North Carolina State School for the Blind, at Raleigh. Because of her work in Nature Study with her pupils and her Scouts, the previous summer the North Carolina Bird Club had awarded Miss Watson its scholarship to the Audubon Nature Camp in Maine. As scholarship chairman I had written to the Director, Carl Buchheister, asking that he and his staff do all possible in suggesting helps for children studying Nature by sound, touch and smell.

So Margaret Watson came back with new enthusiasm and with many new ideas to add to her own original ones, such as teaching forms of clouds by mounting small models of white cotton on sky-blue paper — sky-blue for the benefit of those children who have a slight vision and are able somewhat to distinguish color.

The children have a specially grand time on what they call "Indoor Field Trips" to visit the museum. They get acquainted with a cypress "knee," compare the weight of a meteorite with a stone, and feel of a live snake to learn that it is not slimy. Standing, Lois Cox and Ida May Pressnell; kneeling, Garland Danford, Betty Hendricks, Isaac Spears, George Register, Director Davis.

We worked out, too, a method by which these children could "feel" the stars and the outlines of the constellations by using black thumb tacks on wallboard for stars, connecting them with string to form outlines of the constellations. Thus a totally blind child can feel around until she finds the outline of the Big Dipper, locate the "pointers" in the outer edge of the bowl, and follow out to the star at the end of the handle of the Little Dipper. And lo, she has found the Pole, or North Star! She explores until she has some comprehension of the shape of the two Dippers and of the Dragon that slithers between them. Thus she has "sky adventures" of her own.

It causes a tightening of the heart-strings to hear such children exclaim enthusiastically over some such discovery, worked out by their own exploring fingers.

Other constellations are added from time to time. The Northern Cross, Orion, Cassiopeia, Job's Coffin, the Pleiades are favorites. Too, the teacher and class have worked out a model of the solar system. Sun, planets and their moons are made of modeling clay; orbits by pasting string on penciled lines. Of course, the moons, of those planets having them, had to be attached to the mother planet. But the children understood this was a technical necessity, and that the moons are really out in space.

To many of us who see, yet are all too unaware of the world about us, it comes as a surprise to discover how much these children can be taught to understand and appreciate through their other senses, if they have an interested, capable leader to point the way.

There are thirteen children in Miss Watson's grade, and this year she has had two Girl Scout Troops in the school — a senior and an intermediate troop, and she has also taken the Brownies out occasionally. Last winter these children worked largely on birds and trees; bark and winter buds.

Each child chose his own bird and his own tree to study, and each made a tree booklet. Part of the bird work is done through learning the songs and call notes, helped out with the bird song records and the "Talking Books" made from Dr. A. A. Allen's book *American Bird Biographies*. These start and end with the bird's song. The children love them, and are allowed to check out both the records and the "Talking Books" to their own cottages.

The youngsters learn much of the habitat, courtship, home life and economic value of birds. They are enthralled with the story of migration, and the more advanced students in bird lore find much excitement in keeping first records of returning birds, be they winter or spring.

At their schoolroom window the children have a bird feeding-shelf, and bird houses are in the trees outside. Close by is a mulberry tree, which attracts many birds. A bird calendar is kept, and its records are mainly in braille! The observer writes his or her own name, that of the bird, date, and other comments on the braille paper, using the braille "slate" and stylus to punch the little holes. The teacher cuts this narrow strip and pastes it on the calendar. There it is for all to read — through their fingers.

Shapes of birds' heads, crests, beaks, wings, tails and talons will be studied from models cut out of cardboard. On the shelves are some nests, collected by teacher and pupils. Naturally, they are the worse for wear, as the children handle them in studying them, and nests do not stand much handling. However, they can be replaced from time to time.

Rocks fare better, and there is a small collection of these. The children can distinguish granite, quartz, mica and others by touch. When they go down to the State Museum Director Harry T. Davis, who believes that a museum should serve the people in whatever way is most helpful for them, opens the cases and lets these children feel the various rocks and minerals. They are also allowed to feel other specimens, including some

of the mounted animals. And avid are the discussions as to fur, shapes of head, length of tail, ears, paws and so on.

Girls as well as boys wanted to handle the live, harmless snake, just to know for themselves that snakes are *not* slimy. They "hefted" the meteorite, comparing its much greater weight with that of a stone of the same size. All of them, too, explored by touch the shape and contour, tail, head and shell, of the mounted snapping turtle, which the director gave to the children to take back to their own school museum.

On field trips, as again in my garden, the children study the pines by feeling the bark and also the length of the needles, number in a cluster, and shape and size of the cones. One girl, holding a branch, announces that its needles are short, two in a cluster, the cone rather small — so it is a short-leaf pine. Another girl holds a spray with longer needles, three in a cluster, and a larger cone. It is the loblolly. A third girl's spray has shorter, much finer and lacier needles, five in a cluster. She is told it is not native outside of the mountains and upper piedmont, and that the cone is longer, slender and slightly curved.

"White pine," someone shouts.

During the winter, studying the barks of trees — and winter buds — the children liked particularly the fine beech on their own campus. The beech's smooth bark and long, slender, pointed buds make that tree easy for them to identify by touch. They found the raggedy bark of the river birch also easy, and when its leaves came out they learned that this birch — the only native birch in this part of the South — is also the only birch with leaves that are wedge-shaped at the base. Once this was explained to them, their sensitive, seeking fingers easily recognized the wedge-shaped base.

Wild black cherry with its satiny bark is another of their favorites, and they like to feel the lenticels running horizontally around the trunk and lower limbs. "Lenticels" — they repeat the word; like the sound of it.

Later, and farther afield, Miss Watson will show them the differences in the trunk and bark of the two hornbeams. They know how hard the wood is; they know the famed Roman chariots were made of the wood of a closely related European species. They will feel the smooth, "muscled" trunk and lower branches of the American hornbeam and the entirely different bark, with fine, narrow shaggy strips, of the hop hornbeam.

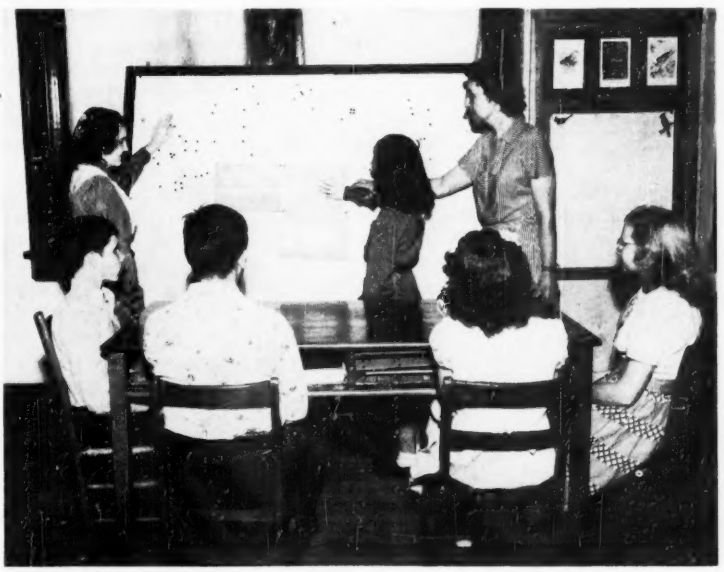
"Winged" bare winter twigs of sweet gum and winged elm, both common in this section, make good subjects for this study. The children can feel — and so "see" — that wings, spray and buds of the sweet gum are much coarser than are those of the winged elm, so there is just no confusing the two, even though both are "winged."

The hanging fruit balls of the sweet gum and the sycamore, both trees common in this section, make good contrasts for observation through touch.

The children are learning flowers through touch and fragrance. "Oh, isn't it lovely!" said one child of the spray of vetch I handed her on a field trip. "Isn't it lovely!" — as the sensitive fingers explored delicate flowers, leaves and tendrils.

And how they want to try things out for themselves: and how fearless about it all! I picked a piece of Virginia creeper, passing it and mentioning the five leaflets that make up the palm-shaped leaf and saying the couplet "Leaflets five, let it thrive." I explained that this plant was beautiful and harmless, whereas poison ivy's couplet was "Leaflets three, quickly flee."

They wanted to feel poison ivy, too! "I'm sure, Miss Watson, that I wouldn't get poison ivy," was one child's persistent plea. Miss Watson, faced with the possible dilemma of a mass poison ivy outbreak just before the children were to leave for their homes for the long summer vacation, had to issue an emphatic "No!"



In the classroom the students learn the stars, the shapes of the constellations and the formations of clouds by feeling of models that have been worked out for them. Sensitive and exploring fingers thus reach out and plumb the mysteries of the heavens. Standing Beatrice Madden, Betty Lou Kleinert, Miss Watson; Seated, Robert Morris, Bobbie Peacock, Zelia Chandler, Jessie Ward.

In general the youngsters seem to be a happy lot, getting along surprisingly well. They were looking forward to vacation, but also to the return in the fall. One girl said: "After a week I'm ready to come back!"

Some of these children come from underprivileged homes, and they have much better care and enjoy many more advantages at school. They have a spacious, beautiful campus of about one hundred acres in a white oak grove, and one of the best indoor swimming pools in the state. How these youngsters can swim! Yet it must take courage for a totally blind child to jump off into black space! Many are excellent swimmers and divers, and usually there is a record that every child in the school can swim.

I remember once when the superintendent and I were watching the swimming. He pointed out a tiny maid who was a regular water-sprite. I noticed a small wooden paddle strapped to her right arm. Not only blind, the poor little thing had been born with one hand missing. She had come to the school timid and self-conscious, and was the only one at that time who could not learn to swim. But they were persistent with her: and patient. A special paddle was devised to fasten on her arm, and soon she was swimming fearlessly. "She's about ready to discard that paddle," said the doctor.

"Blind magic!" How often had I thought that as I saw the many things they did so well through the senses of hearing, touch and smell. Tiny kindergartners reading fluently with their finger tips; girls sewing, by hand and by machine, and threading needles; boys playing baseball; boys and girls both skating along the campus cement walks; handicrafts; music. If a child shows any musical talent he is given lessons from a good teacher, and supplied with an instrument. They have a fine school orchestra, with pianos, violins, bass-drums, trombones, traps. They also have an outstanding glee club.

Comparing pine needles and cones. Jane Ijames, left, holds a branch of loblolly pine, while Ruth Lovett pulls down a branch of short-leaf pine. Jessie Ward holds a small spray of white pine. Feeling the length of the needles, the number in a cluster and the size of the cones, they identify the specimens.

"Blind Magic!" Surely, I thought, there must be a genie and a lamp, somewhere. And genie and lamp there are, enabling these blind children to see and know with eyes that see not. The lamp is the fine institution, and the genie is the able teaching corps, backed by a State that is doing much for its blind children.

A visitor is struck by their obvious cheerfulness and enthusiasm. When I asked some of the teachers if these children were not often inclined towards despondency and brooding, one teacher replied; "If you could hear them laughing and singing and carrying on in the halls and their rooms, you wouldn't think so."

"Of course," added another, "we do have to contend with both at times, especially in the older newcomers, and particularly those who are blinded by sickness or accident. But it is surprising how quickly they acquire courage and determination."

Thoughtfulness and cooperation must be a part of their training. Or does blindness make it just instinctive? I noted so many times the unobtrusive way that those who have a little sight would help those who are totally blind.

As far as possible these children are trained to work and play like normal children. Their other senses are so developed as to offset the handicap of blindness. I recall letters I had from some of these children years ago when I was running a "Choose a State Bird" contest in my Nature column in *The Progressive Farmer*. They were among the best I received. One boy wrote:

"We have our state flag, state emblem, state song, and state flower which mean much to us, especially the song which we can hear and sing. I think a state bird would also mean much to our people, especially to those of us who are deprived of our sight and cannot fully realize the beauty of flag, emblem and flower. My choice is the mockingbird."

Another excellent but much longer letter, discussing bird songs in terms of pitch (Continued on page 452)

"Letter Please," Says the Secretary Bird

By W. T. MILLER

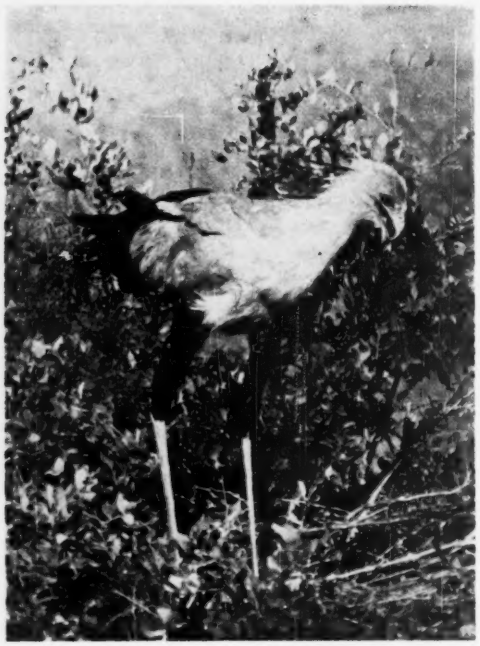
Photographs © by the Author

A snake's eye view of the secretary bird, the most striking and extraordinary bird of the African veld. It really has feet, but these were obscured when the photograph was taken. Below, young secretaries on the nest. The egg-tooth used to break through the shell is still visible.

THE most striking and extraordinary bird of the African veld is undoubtedly the secretary, bird with legs like a crane, a crest like a cockatoo, a beak like an eagle — it is no wonder that it was for a long time something of an ornithological curiosity. When the first specimen was sent from the Cape as a gift to the Prince of Orange, just about two hundred years ago, it caused considerable argument among European scientists. It might be a crane, it might be a stork, it might be almost anything. They named it the Archer, *Sagittarius*, because its upright carriage and dignified stride reminded them of a bowman advancing to loose a shaft. Nowadays the secretary is classified as one of the *Accipiters*, a bird of prey closely related to the eagles, hawks and vultures, but sufficiently different from it to be given a family name of *Sagittariidae* all to itself.

It is indeed an abnormal eagle that, because of its long legs has acquired considerable powers of walking and running. It is a pedestrian among a family noted for flight, or as one ornithologist describes it, "a long-legged, marching eagle." We see the secretary bird — or more usually a pair of them together — striding vigorously over the open veld, intently searching the ground for anything alive. If we try to get nearer to them they speed up their elastic step a little, and walk away faster than we can. If we run, they break into an elegant trot, and, finally, if hard pressed, they spread their wide black-and-gray wings and take off into the air. Such an escape flight is rarely for more than two or three hundred yards.

Ultimately, perhaps, the secretary bird may lose the power of flight altogether. Today it definitely prefers walking to flying on ordinary occasions, and always needs a preliminary run, into the wind if possible, before it can launch itself into the air. Once air-borne, however, it is a powerful flier. In the mating season, paired birds will spend hours circling at great height over their chosen territory, soaring like eagles on an impressive expanse of wing. They still roost and nest in trees. The secretary's foot has only three toes, heavy and blunt, and the foot is not much use for clutching. So the bird lands awkwardly on a branch, and maintains its position by balance. It sleeps in a crouching position, with legs doubled under it.



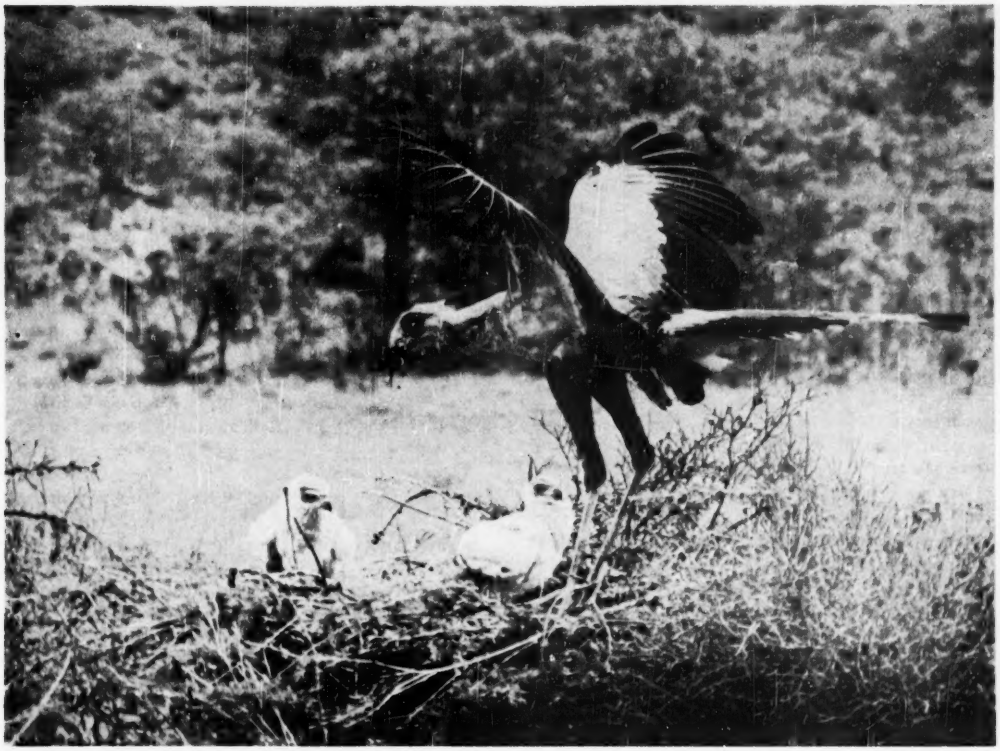
A secretary bird on the prowl. Its main diet seems to be insects, with particular emphasis on grasshoppers and locusts.

It is a continual matter for astonishment that the secretary's immense nest can be so effectually concealed as it is among the leafage of a tree. The nest is a broad, bulky platform, maybe five feet wide and two feet thick, made of heavy sticks strewn over with dry grass. It is often the accumulation of several seasons, not infrequently becoming, in the end, so heavy that the supporting branches collapse altogether. The secretary may choose almost any kind of tree according to locality, but in my part of the high veld (Matabeleland) I have never seen any other than the common thorny mimosa used. These trees are flat-topped and dense in structure, often with a parasitic growth of other thorny plants or "mistletoe" to make them denser still. During the month of August I have watched a secretary trampling slowly and awkwardly around in small compass on the top of such a tree, apparently to make a suitable place. Later it carries long, heavy sticks and tramples them securely into position. The great bulk of the nest is slowly built up, and the final touch is a thick layer of dry, coarse grass, which is usually added early in September. Big as the final structure is, it is often unnoticeable unless one stands directly under the tree. I passed one nest daily for several weeks without seeing it, and it was finally betrayed by the droppings of the young birds that painted the lower foliage a tell-tale white.

The nesting of secretary birds is a protracted business, occupying at least seven months of the year. The eggs are usually laid in September, and the incubation time is approximately six weeks. A further period of twelve to fourteen weeks is needed for young birds to become fully fledged and ready to quit the nest. In all the nests I have seen there have been two eggs, plain white in color, rough and chalky in texture, and measuring about three and one-quarter by two and one-half inches. Here begins a mystery, which other observers may be able to confirm, deny, or explain. The secretary is not a rare bird in my district and I have been able to examine a number of nests. Two eggs seem to be the rule, but I have never yet seen two fully fledged young ones together in revisiting the nest later. Only one young one appears to survive to maturity. I feel that I have seen this happen too frequently to ascribe it always to accident; and, so far I have not been able to find any trace of the young bird that disappeared. Of the two birds used as illustrations here, one disappeared between the seventh and ninth weeks, during a fortnight when I was unable to visit the nest.

For the first four weeks of their life the young birds are covered in rough, woolly, white down. They live on food pre-digested in the parents' stomachs, and obtain it by thrusting their heads into the parent bird's wide open mouth while the food is regurgitated. As

A young secretary bird about fourteen weeks old standing on the nest. The popular name comes from the trailing crest of black feathers that suggest the old fashioned quill pen that used to protrude from behind the ears of clerks.



The secretary bird arrives at the nest, its bill full of grass rather than food for the young. This photograph shows the wing span and the markings of this interesting member of the African bird assemblage.

the birds grow the parents throw lumps of partly digested food on the nest platform and leave it for the nestlings to cope with themselves. At different times I have seen guinea-fowl eggs, torn lengths of snake and whole lizards thus left. On one occasion a secretary was suspicious of my blind built in a neighboring tree, and sat under a bush some distance off for nearly an hour watching me. Finally she flew to the nest, and stood on the rim and began a series of convulsions. With gaping beak she twisted her neck forward and back in terrific strain, and at last managed to throw up three very large lumps of flesh — the torn body of an almost fully grown hare. However, I believe that the main diet of the secretary is insects, beetles, hornets, and particularly the tribe of grasshoppers and locusts. The two young birds photographed showed considerable resentment at my repeated visits to their nest. They tried to drive me off with hoarse croakings and fierce beak snappings. These being ineffective, they would shuffle back to the farthest edge of the platform and sulk, lying still with their heads down, playing dead. Then suddenly waking into a convulsive sickness, they would fling the contents of their stomachs into the nest. Lizards, mice, locusts, young birds, snakes, chameleons, all appeared at some time or another, but only as isolated items in a soup of half-digested locusts.

The first real feathers to appear are the crest, which begins as two parallel black lines down the back of the head. By the sixth week the rest of the plumage is showing, and is complete about the tenth week. It is the same as the parents' — a fine dove-gray, with black on the wings and at the end of the long, outstanding tail, and black on the thighs. The lower legs are pink, and around either eye is a patch of bare skin of vivid orange. The effect, combined with the erect carriage of the bird, is like an elegant gentleman-in-waiting, with black knee-breeches, and a sword thrust out behind his coat tails.

And now, fully fledged, the young secretary must learn to stand. Until now it has either sat on the platform, or at most squatted up on its thighs. The long, delicate legs are easily broken and not to be used too early, even on the broad, solid level of the nest. Once this new accomplishment is learned the young bird begins to exercise its wings daily, and is soon ready to leave the nest altogether. At this time it seems to receive a quickening of the spirit that turns it into an

aggressive fighter, a phenomenon that I connect closely with the new strength in its legs.

Feet are certainly the secretary's most formidable weapons of attack. It advances on its prey with crest erect, beak gaping savagely, and the black wings spread to their full span of eight or nine feet. Such a threatening show draws all one's attention. Then, while one's eyes are on the vicious head and looming wings, there comes a swift devastating kick from the sturdy foot, followed by heavy trampling. It is probable that in attacking snakes the outflung wings act as a shield, confusing the reptiles and leading them to vain striking. Great agility is demanded, however, for secretaries are not immune to snake venom. A case is recorded of a secretary bird, struck in the wing by a snake, dying of poison after the attack.

It is an often observed habit of eagles to carry fresh green leaves to their nests daily as long as they occupy it, right through the time of eggs and young. The secretary bird has the same habit, bringing a tussock of dry grass in its beak at each return to the nest and throwing it carelessly on the platform. I have never yet seen a secretary carry prey to the nest in its beak.

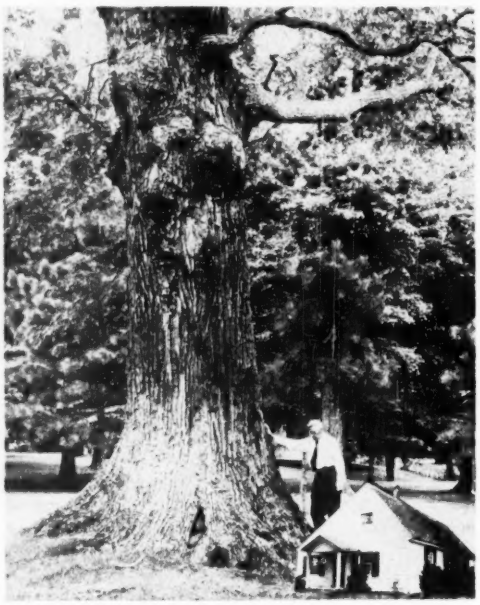
Mountain and forest country have no attraction for this fine South African bird. It belongs to the open Savannah veld, particularly where the grass is not too long. Although the fine of £5 formerly imposed by law on anyone found killing a secretary bird is no longer exacted, the bird is not subject to any persecution. Sportsmen complain that it destroys young game, but the balance of good work seems to be strongly in the secretary's favor. Fortunately the majority of South Africans have a sentimental admiration for this pedestrian eagle, and its numbers are not diminishing. Seven pairs are recorded within a thirty mile radius of Cape Town. In the high veld I know of as many pairs within a radius of six miles, a very different picture from one given by an earlier writer, who states that the secretary bird will drive off any intruders of their own species should they come within ten miles of an established nest.

The bird owes its popular name of secretary to the trailing crest of black feathers that hang behind its head, much as the old fashioned quill pen used to hang behind the ears of clerks a hundred and fifty years ago. The Dutch name of *Slang-vreter* records its snake-eating powers. Its scientific name, *Sagittarius serpentarius*, goes back to the early name of archer, coupled with snake-killing again. It has been the fashion in recent years to decry the secretary's destruction of snakes, which so impressed the early settlers in this country, as much overrated. I do not think that this is so.

"O', Spare that Aged Oak"

By S. GLIDDEN BALDWIN

One interesting tree that I met in my travels while looking for the largest trees in the eastern half of the United States is a white oak to which the title of a popular poem of yesterday applies. This majestic sentinel guards a little, white, frame church known as the Friends Meeting House of Third Haven near Easton, Maryland. They have been together since 1684, when the church was finished. Neither has changed much. The tree has grown larger, perhaps, during this span of 264 years, but so has the church, since it was widened on one side in 1797, and, somewhat later, by the addition of a porch entrance. George Fox, the founder of the Religious Society of Friends (Quakers) worshipped here, and William Penn preached here in 1700 to a large assembly, among whom were Lord and Lady Baltimore with their retinue. The meeting house is claimed to be the oldest frame church in America. The circumference, breast high, of the tree is 17 feet, 8 inches, and Mr. F. W. Besley is seen admiring it. Mr. Besley was state forester of Maryland for 36 years. Just to touch such an old and venerable tree gives one a thrill. The Church



actually stands in the background as you can see if you look closely, but is combined in miniature in the photograph because both tree and church belong together, which the photographer has been able to arrange.

Chaparral — "its outer skin, rippled and creased like the thick coat of a fat and healthy sheep just before the shearing, looks, from a distance, tight and soft and smooth enough to walk upon."

Plants of the Chaparral

By LESTER ROWNTREE

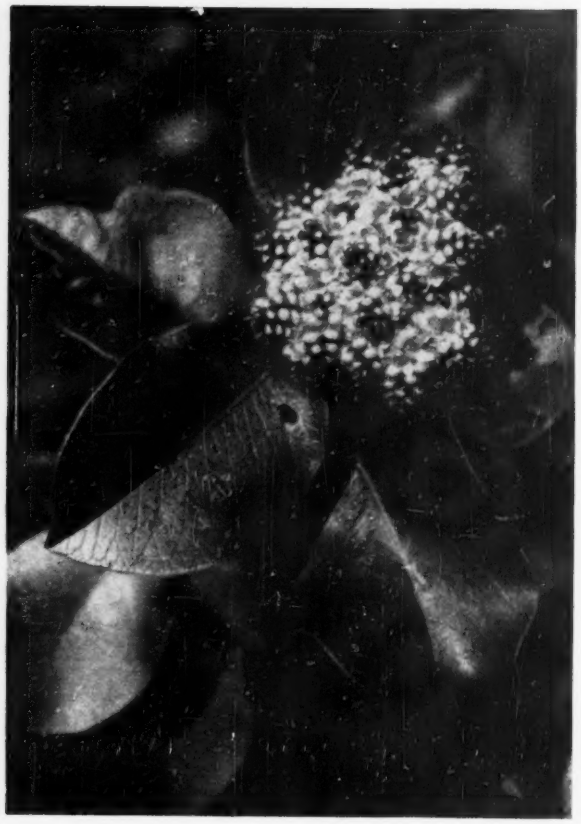
Photographs by the Author

CHAPARRAL is the name given to that dense mass of shrubs that covers some hills and lower slopes of our western mountains. This blanket of vegetation clings to changing contours and may follow them to the Pacific's edge, swoop down to line canyon sides and clothe the earth's surface for unbroken miles. Its outer skin, rippled and creased like the thick coat of a fat and healthy sheep just before the shearing, looks, from a distance, tight and soft and smooth enough to walk upon. But, although I have experimented with many such nested growths, I have rarely been able to stay on top for more than a few yards.

In southern California chaparral is as familiar as the geranium, so commonplace that it is passed and repassed with only a subconscious awareness of its existence. The newcomer at first may frown upon this imperforate coverlet, but he soon accepts it as a bit of Californiana and treats it as a matter of course. He may even become more attached to its fragrant, velvety finish than he is to the geranium. But, fond as he may be of it, he seldom goes to the trouble of finding out which shrubs go into the making of this tapestry, which precedes the memory of living man; precedes even the geranium.

What with the present demand for homesites and the land needed for cultivation, the lower chaparral reaches are now being nibbled into; land is cleared and the rich soil the shrubs have built up becomes the home of exotic plants and farm products. Each year new crops of homes and clearings appear above the valleys. New roads thread the chaparral, follow the canyon sides, and end in freshly opened patches which, although they may consist of many acres, must look like mere specks to the red-tailed hawks as, with motionless wings, they circle high in the air. These splotches are particularly noticeable in spring, when they are green, and again in late summer when they are straw-colored, as, from the narrow twisting roads below, they appear and reappear like islands in a sea of dark evergreen.

The western name of chaparral is distinctive. Other countries have their massed growths of shrubs, each known by a different name. In New Zealand the olearias and bush veronicas we grow in our gardens are inhabitants of the sub-alpine "scrub;" the Corsicans call their cloaks of dwarf bushes "makis." Along the Mediterranean the welter of brooms, lavenders, Kermes oaks, thymes, rosemarys and rock-roses is known as the "maquis," or the "macchia." From this came the Maquis of World War II, guerilla fighters dwelling in the mountain scrub. On the veld of Africa, there are patches of shrubs, taller than those that make up chaparral, and this boscage, as in Canada and Australia — whence come our dwarf eucalypts and acacias — is referred to as "the bush." In North



The dark green of the sugar bush, above, adds its bit to the beauty of the chaparral, and the green manzanita, below, forms the most uninterrupted stands found in this growth.

Carolina the rhododendron jungles go by the name of "slicks," and there are places where the bushes are so closely jammed together that it is possible to travel the surface for several yards. When I go to North Carolina and Tennessee to study those bare, isolated mountain tops, known as "balds," and sleep in the elfin forests that circle them, I am reminded of the chaparral at home. During my five days and nights on Roan Mountain I could imagine myself in chaparral at the edge of the Pacific, or on a heather moor in Scotland. There was the same chill and mist at dawn, and a cushion of bush beneath me. but when I peeped from the fog-saturated bed roll there were dwarfed alders and hazel instead of *Ceanothus* and manzanitas, and the charming *Buxifolium prostratum* instead of heather. Rhododendron leaves rattled, the stiff low boughs of balsam fir chattered, and the wind played its games with leaf and branch.

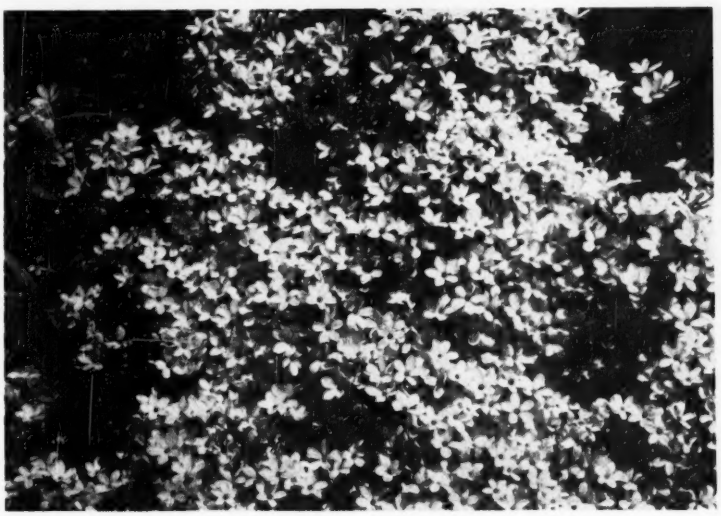
The origin of the word chaparral has been explained in many books. It stems from *Chaparro*, which means scrub oak. a shrub not appearing in every chaparral and no stiffer than many another chaparral ingredient. To quote from myself: "It is because chaparral contains so much formidable *Chaparro* that those who penetrate it on horseback encase their legs in *chaparreros*, or *chaparajos*, or just plain 'chaps'." In southern California chamiso. *Adenostoma fasciculatum*, is the most plentiful of all chaparral species. When no other bush was mixed in among it, early Californians called this particular chaparral *chamisal.* Chamiso or chamise is a five-foot shrub with lovely. gray, shredding bark, and in June, when most chaparral bushes have finished blooming, the ends of its branches are fluffy with long panicles of creamy spirea-like bloom. The fresh or dried leaves of a taller, more slender, Adenostoma, *Adenostoma sparsifolium*, locally known as yerba del pasmo. herb of the spasm, have been used by Indians, Mexicans and California ranchers as a remedy for snake bites, lockjaw and blood poisoning. This species is now thought to contain penicillium, and its usefulness may bring about its undoing. This has happened before to some of Nature's offerings.

Wild lilac, *Ceanothus*, and manzanita, *Arctostaphylos*, are prominent members of chaparral. *Ceanothus* species and

varieties number about one hundred and fifty. Most of these are natives of the extreme West but not many of them can be called chaparral plants. Stiff, white-flowered buck bush, *C. cuneatus*, heads the chaparral list and in some places forms stands in which no other shrub tries to compete. When it grows out of the chaparral belt it assumes a less uncompromising character, and may not be recognized as the inflexible gray-barked bush of armored slopes. Tobacco brush, *C. velutinus*, is one of my favorite chaparral wild lilacs. This is the glistening shrub that, at 7000 feet, on exposed rocky sides of the Trinity Mountains, makes low, windblown, quite impenetrable, sheaths of glistening, bright green, giving sanctuary to no other vegetation. Its leaves, which shine as though shellacked, give off a spicy balsam odor when crushed, and in July the whole green pelt is smothered in creamy flower trusses — large, heavy and overpoweringly fragrant. Several blue-flowered and lilac-flowered *Ceanothus* enter chaparral, and among them is red-heart, *C. spinosus*, whose tall branches fleck some southern Californian chaparrals in March with lacy billows of pale blue. The color of the wood of the root-crown has earned this wild lilac its common name. A wind-blown seaside knoll, less than a quarter of a mile below my home, is enveloped by Monterey *Ceanothus*. *C. rigidus*. In February the small dark foliage that surfaces this three-foot, densely intricate coat begins to flush with color, and by March the whole huddled mass is clothed in lilac. Among the hundreds of bushes, three bear pure white flowers, and these stand out against the pink sheet like three very local and very fresh falls of snow.

Bush, *Mimulus*, above, contributes green foliage and yellow bloom, while bushlets of *Gilia* add a touch of snowy white.

The manzanita that forms the most uninterrupted stands of chaparral is green manzanita, *A. patula*. There are places in the mountains of northern California where this species forms many acres of closely-knit padding, two feet tall and quite impossible for a pack horse to enter. There the narrow, pink, honey-scented flower urns come in June, and hang from branches where thick leaves stand up like listening ears. The bloom is followed by ruddy berries, which at one stage of their development just match the crooked, mahogany branches, in color, smoothness and sheen.



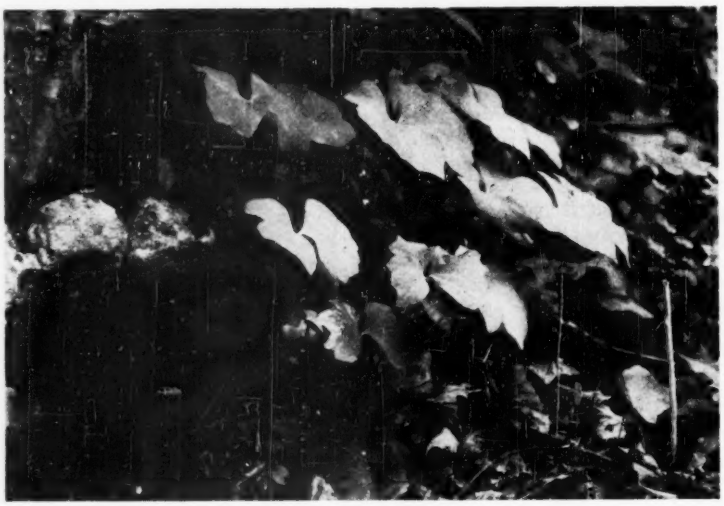
Chaparral in which there is

an assortment of shrubs gains in color and foliage interest, and it is fun, when at a distance, to try to distinguish each species. When there is no bloom, there is the gray of some manzanitas, the silver of white sage, the dark green of sugar bush, *Rhus ovata*, and the bright green of islay, inland cherry, which is really a plum. During the summer wild peas stretch lavender and white blossoms across the tops of branches; the clematis stars that drape the upper boughs are followed by the white fluff of seed, and there is always the play of lights upon the plushy hide. Each exposure has its typical chaparral. Eastern slopes have their sages, their heat-loving buckwheats, and often the snowy, ten-inch bushlets of *Gilia nuttallii*, which looks like a phlox. Dry washes in southern California have their larger bushes of prickly phlox, *G. californica*, enveloped in gorse-like leaves and pink, shot-silk flowers. The hill I see from my study door is clothed in the gray of coastal sage — not a sage at all but aromatic *Artemsia californica* — and dappled with the green foliage or the yellow bloom of *Diplacus*, a bush mimulus. Down the dramatic Coast Road, which, south of Carmel, clings to the mountains and follows the wave-dashed rocks that edge the Pacific, silver-leafed bush lupine, *Lupinus albifrons*, has taken possession of a mountain side and shrouds it in a sea of silver. In spring the crowded pearly bushes are shot with spikes of purple-blue, and Carmelites, who call this place the Blue Mountain, flock south to gloat over the spectacle.

If I were writing a book on chaparral and the many shrubs and smaller plants that go into its making, I would devote a whole chapter to the value of this covering as an erosion preventative. It is only when fire has blazed through chaparral, and at one fell swoop denuded a mountain of its protective thatch, and rain washes off the top soil and cuts the surface into deep gullies, that there comes the realization of the importance of this natural bush forest. It is shocking indeed to come suddenly on a ghastly waste of blasted earth that was wrapped only yesterday in beloved chaparral. Chaparral is quick to return to the scene of destruction and, if there is moisture, a burned area soon bristles with seedlings and the sprouts from old roots, but it takes many years for the new set of bushes to replace the washed-off soil built so slowly by their predecessors, now represented by charred and blackened branches.

Twin-leaf

By WALTER S. CHANSLER



WHILE tramping about the woods, in late spring, anywhere in the eastern part of the United States northward from Tennessee and Virginia, one is likely to see a pretty little plant with a solitary white flower terminating a naked scape six or eight inches long. This stands among several long and rather frail leaf-stems, each of which bears a large, smooth, palmately veined, two-parted leaf. This is the twin-leaf, *Jeffersonia diphylla*, a perennial belonging to the Barberry Family and taking its name from the fact that its leaves are divided into two identical parts.

Growing in dry, well-drained soils, often on rocky hillsides, or in open places in the woods, this medicinal plant frequently appears in loosely formed clumps or in small patches. Sometimes it spreads in scattered fashion over a rather wide area, or along the base of an outcropping of limestone or other rock formation. The plant flowers in May, or early in June, depending upon its geographical location. A peculiarity of the plant is that it blossoms when only six to eight inches tall, then continues to grow until its fruit has ripened, at which time it not infrequently has attained a height of fourteen to sixteen inches. The fruit is a small, obovate capsule, which develops quickly after the flower has withered.

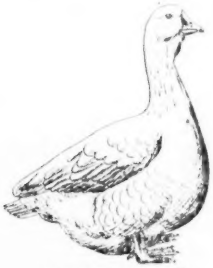
The twin-leaf may be grown quite readily on home grounds by transplanting in the spring, at the time growth starts. Like many of our wild woods plants, it is usually well rooted and will thrive with ordinary care if planted in moist, partly shaded ground. However, the young plants should receive a fairly generous leaf mulch after they get well started. Cultivation is not necessary. When grown among other plants, this wilding of the oddly shaped leaves adds to any garden.

ROUEN DRAKE

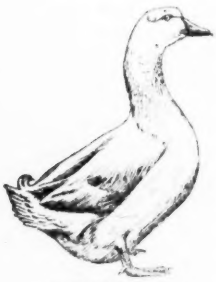
Birds in Gilded Cages

By E. LAURENCE PALMER

This is the fifty-third in NATURE MAGAZINE'S *series of educational inserts*



EMBDEN GOOSE



CHINESE DUCK

GUINEA FOWL

TOULOUSE GANDER

When the barber shop quartets sang: "She is only a bird in a gilded cage," they obviously intended to express pity rather than envy for one thus captive, and, of course, they were not singing about a bird. Certainly, it is debatable whether we should feel that a free, wild organism, living an independent existence and facing all problems with whatever individual resources are at hand, is better off than another organism that has its food, shelter and health needs supplied by still another paternalistic agency. J. C. Branner, in his introduction to his *How and Why Stories*, tells feelingly of the mammy who raised him in the slave days, only to end her days amid hardships she never had had to face before. In spite of her difficulties, she answered Branner's inquiry as to how she felt about her changed status by saying: "After all honey, dere's de feelins." To this comment, Branner replied that he never again had anything to say in favor of slavery. This philosophy may be as applicable to government as it is to poultry.

It is difficult for a rational human being to think clearly in matters that pertain to the domestication of species of animals other than our own kind. There are in some parts of the world great human populations that will not eat of domestic animals, even though it is dietetically obvious that these people need animal food. In one instance, this prohibition was solved by separating roosters and hens so that eggs laid could not be fertile. Since the eggs were not fertile, they could never develop into animals. Therefore, consuming them as food was not killing an organism that did not have the power to reach maturity.

We may consider domestication philosophically. If, as time goes on, and we surrender our individual rights and responsibilities to our community, which surrenders it to the state, which surrenders it to the nation, we may be forced to wonder if we will not eventually be fed, watered, put to bed, and possibly even killed, by some outside power that may be gradually working us into a gilded cage position. Some will take this philosophically, as does a duck or goose. Others may continually fight to regain their lost liberty. Still others, like the parrot, may merely sit back and scream phrases that have been taught to them, phrases that they cannot possibly understand.

And so, when we come to the study of the domestic birds presented in this insert, we offer some of you the opportunity to philosophize. Still others may find in our presentation suggestions that may be of economic importance. You may wish to raise squabs, ducks, or cage birds for a profit. If so, you should know something of the requirements of the creatures with which you are to deal. The artist may see in the peacock's tail a thing of beauty; the fly fisherman excellent material for making the body of an artificial fly. The musician may respect the judgment of beauty-of-the-peacock's-tail converts, but be offended at the bird's raucous voice. The ornithologist may be interested in whether the gaudy feathers

CHINESE WHITE GOOSE

HOMING PIGEON

POUTER PIGEON

RUNNER DRAKE

MYNAH

to the rear of a peacock are the tail or the tail coverts, and find some satisfaction in referring to them correctly. The poultryman may be disgusted that a huge-bodied bird such as the peacock does not yield to management for the production of flesh, as do such smaller birds as the ducks and chickens. The historian may revel in the part peacocks played in ancient banquets, in beliefs regarding their immortality, and the reputed nutritive value of their tongues and brains. The hard-headed business person interested in peacocks will have to be sure of an unusual market if he is to find anything but headaches associated with the rearing of peacocks in most parts of America.

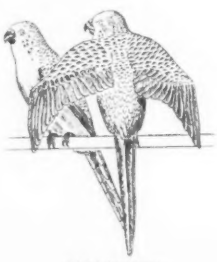
In this series of inserts we have already introduced you to some kinds of domesticated animals. Early, we had a number on domestic mammals. Later, we had one on poultry. This insert is designed to consider the more important birds, other than chickens, that have yielded more or less gracefully to the influences of domestication. Roughly, the groups considered are a few out-and-out cage birds, a couple of pigeons that may or may not be considered as cage birds, a few aquatic and semi-aquatic domestic birds, and the turkeys, guineafowl and peafowl, which are closely related to the chickens, but, of course, are not chickens. There will be those who may contend that some of these should not be considered as birds in gilded cages, but we stand by our plan, even though we admit that some of the gilding has worn rather thin, and the bars of the cages may be more imaginary than real.

Whatever one may say, it must be admitted that the birds here considered have yielded some of their freedom, and much of their responsibilities, to man to such an extent that over much of the range they now occupy they would probably quickly disappear without man's assistance in times of stress. As has always been the case in these special inserts, most of the essentials of life history of forms considered are presented in the tables associated with this discussion. While some of the material has been presented in the author's new book, *Fieldbook of Natural History*, most of it is new, and, with one exception, the pictures have not been used before. The illustrations are, for the most part, by E. M. Reilly, Jr. A certain amount of duplication cannot be avoided in discussions dealing, for example, with

MACAW

PARROT

COCKATOO



LOVEBIRDS

the size and color of duck's eggs.

But now for the birds themselves, and more particularly the birds that may be thought of as cage birds. We suggest here a few parrots, a canary and a mynah bird. Were this article written fifty years ago we might well have included suggestions for trapping and keeping our commoner song birds. The literature of those days tells us how satisfactory cardinals were for cage birds. Goldfinches, redpolls, and many other sparrows were recommended as being species suitable for trapping and keeping in cages. Now that our native birds are protected by federal laws, we can no longer confine our local species, even though they may have suffered injuries that might make their survival outside improbable.

Cage birds are kept undoubtedly for the beauty of their plumage or the beauty of their song, as with the canaries, or because of their beautiful plumage or interesting habits, as with the parrots. Keeping and breeding cage birds has been going on so long that it is only natural that considerable specialization has evolved. We can now select our canaries for their beautiful feathers, the loudness of their song, the sweetness of their song, or their ability to submit to training and to do tricks. Each of these groups will have its defenders among bird fanciers, and, of course, each protagonist is entitled to its own wishes in the matter. Western European countries have differed, not only in their political philosophies but in the standards they seek to develop in their caged canaries, and it is about as difficult to reconcile one of these differences as it is to modify another. This, of course, makes it possible for us to pick whichever may appeal to our fancy and make the most of it.

The breeding of cage birds is an art that requires much patience and brings, to many, phenomenal rewards in personal satisfaction if not in financial returns. I well remember visiting the home of a college professor in Mount Vernon, Iowa, a few years ago, and being practically overwhelmed with details about the individual differences, the likes and dislikes of a host of canaries kept in a large cage, and in a series of smaller cages, in his home. This professor got the same satisfaction from his canaries that some of the rest of us do from stamps, color photography, flower gardens, genealogy, stock

market records, new discoveries, golf, rare books, professional honors, record trout, bridge or artificial trout flies. Who can say that the canaries are more or less wholesome than these other objects of your interest, or of mine? One must, of course, make adjustments in one's way of living if birds are to be permitted free flight in the living room, and yet I know of at least three families where the satisfaction of having the birds about is considered as worth more than the unpleasantnesses associated with their presence.

Another friend of mine rarely sees me without telling me of his parrots and what they have been up to. I rather think I have been conditioned against parrots by a vicious creature that lived for years in the home of a relative, and seemed to feel for me an antipathy similar to that I felt for the creature. So far as I am personally concerned, you can have your parrots, or keep them in a zoo where I can see them, and when I want to leave I can do so whenever I wish.

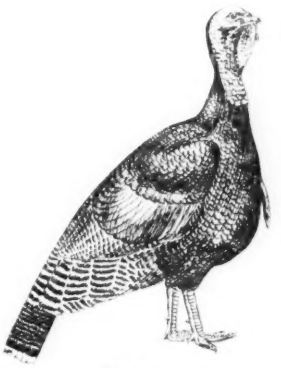
Those who harbor cage birds seem to have the idea that they can communicate, one with the other, to a surprising degree. One relative used to boast of how her canary responded to her spoken words, and yet careful studies of the hearing range of canaries indicate that the canary could not hear her voice. Probably the vacuum cleaner really had a more significant sound, so far as the canary was concerned, and, in view of some comments I had in regard to my questioning the instincts and intents of so-called carnivorous plants in an earlier insert, I hesitate denying intelligence to the vacuum cleaner. I can not resist wondering, however, what a vacuum cleaner might say that would interest a canary, and to what degree the song of the canary might affect the efficiency of the vacuum cleaner. Possibly some reader can help me in this matter.

When we discuss cage birds with hobbyists there are always those who, of course, extol the superior intelligence of their particular pet. Certainly, one must admit that many parrots can make sounds that more closely resemble some of the words used by man than is the case with the canaries. But, even so, there are some of the more than 100 kinds of parrots that are better "talkers" than others. Probably, also, parrots make better talkers than do the more active and gorgeous cockatoos. But, granting this, it is difficult to say that the best-speaking parrot can match the apparent ability possessed by some of the mynah birds, which now and then appear in cages. And certainly some of our common crows can better some of the parrots in what seems to be linguistic art.

PEAFOWL

CANARY

MUTE SWAN


TURKEY

Before this article appears in print, I will have been in Hawaii, where mynah birds are as common in the streets and parks, and about the public buildings, as are their close relatives, the starlings, around our national capital. If they have increased much in numbers since I was in the islands nearly twenty years ago, I shall be interested in seeing if they have left any room for other birds. Mynahs make interesting cage birds in zoos. Bill Mann, Director of the National Zoo in Washington, had one that pointedly asked Congressional committees, "How about appropriations?" Now and then mynahs appear on radio programs, but one wonders if really they can match a chickadee, a yellow warbler, or a redstart for real virtuosity. For my part I never yet heard a cage bird that could offer any competition with a white-throated sparrow.

There is one group of birds, however, that have helped man greatly in carrying on communications — the pigeons. They served with distinction in both world wars, and they have been used for years in peace as well as in war. They cannot sing in a way that pleases us. They cannot match the beauty of feathers of many of our common birds, but they can be depended upon to return to their homes with maximum speed, whether it is relatively near or far. With a message fastened to their legs, such a trip may well mean the saving of human lives. These birds have, in many cases, reached such a degree of domestication that they can be released from their confining bars with every assurance that they will promptly return to man's protecting(?) influence. Some pigeons have so adapted themselves to this dependence that they probably could not survive on their own. This is certainly true of some of the fancy breeds that have lost the power of flight.

We have, of course, set the dove up as an emblem of peace. As such, it would seem that it should have some election as to the nature of its own future. Instead, man has stepped in, and (Continued on page 432)

COMMON NAME	GUINEA FOWL	TURKEY	PEAFOWL	CANARY
SCIENTIFIC NAME	*Numidea meleagris*	*Meleagris gallopavo*	*Pavo cristatus*	*Serinus canarius*
DESCRIPTION	Cock and hen alike in general appearance, although hen is slightly smaller. Body is stout, slate-colored with small, round, white spots, with short dependent tail, bare legs, slightly curved claws, a long, slender neck and a crown like a bony helmet. Temperature is 110°F.	Weight of gobbler or cock is to 36 pounds; of the hen to about 20 pounds. Gobbler has bronze neck, back, and wings with feathers black-tipped, large red wattles and tuft of long, bristle-like breast feathers. Tail feathers are white-tipped in domestic turkey, chestnut-tipped in wild	Cock is to 6 feet long, including gaudy 4 foot tail, which may be spread to form spectacular fan with some feathers characterized by beautiful eye-spots. True tail supports the gaudy tail and is not in itself conspicuous. Head bears to 24 gold-tipped feathers. Female not so conspicuous	Length to about 6 inches, including 2½-inch tail. Color and size variable depending on the breed involved. English canaries are large, brightly colored, louder singers than the German canary, breeds that excel in variety and beauty of song. Color is usually mostly "canary" yellow
RANGE AND RELATIONSHIP	Originated in West Africa from the Sambia to Gabon rivers, whence it was brought to Europe by Portuguese in Middle Ages. East African *N. ptilorhyncha* does not domesticate easily. Domestic breeds include the pearl, the white and the lavender, of which the pearl is the most common.	Modern domestic turkey is developed from the Mexican *M. mexicana*. Popular varieties include the Bronze, White, Narragansett, Black and Slate, with the bronze by far the more popular. The rare ocellated turkey, *M. ocellata*, is a native from Central America	Indian peacock is native of Burma, Malay Peninsula, Java and India. White peacock is a sport of Indian peacock. Japanned peacock (not Japanese) has upper wing coverts lustrous blue rather than brown and white. Brought to Palestine by King Solomon and to Europe at an early date.	Native of the Canary Islands, but wild birds are found in the Azores and Madeiras. Most of the varieties carry with them the name of the area where they were developed — as Scotch, Belgian, German, Yorkshire, Norwich, Hartz Mountains and so on.
REPRODUCTION	In wild state, guinea fowl may run in flocks of to 300. Nest is hidden in brushland or thicket. 16 to 24 pointed, hard-shelled, yellow-white and brown-spotted eggs are incubated from 25 to 28 days, when chicks run almost immediately with the mother, who is a poor caretaker. Hard to raise	Definitely polygamous with 1 young gobbler able to care for 15 hens, while 12 are allowed for a yearling and 8 for an older bird. Nest is hidden on ground if birds are range free, but in a box if kept captive. About 15 eggs constitute a clutch, the eggs being light brown with brown spots.	Nests on the ground, where 12 to 20 glossy-white, pitted eggs about size of goose egg are laid. Incubation for about 28 days, often in captivity by a turkey hen, since peahen is not dependable. One brood a year. Full plumage reached at about 6th year and reported to live more than 100 years.	Some 8 days after a mating the first of 4 or 5 eggs is laid in a nest with caged birds. Incubation for about 13 days by both parents, but mostly by the hen. Young are rather helpless when hatched and are fed in nest for 3 weeks by both parents and become independent in about 6 weeks.
HABITS	Food is insects and seeds gleaned from woods and fields. Chicks in captivity are fed at 36 hours, 3 times daily, with hard-boiled eggs and bread crumbs, and then chick feed. By one week, can get own feed, and by 10 weeks may weigh 1½ pounds. Adults may weigh to 4 pounds.	Chicks require no food first 2 days. Eat boiled egg and cornmeal bread first week, then grain and buttermilk with meat scraps, gravel, charcoal, vegetables and insects. In captivity, are reared on wire to avoid parasites found on the ground, and this has revolutionized the industry	Food essentially that of most poultry, including, in addition to grain, insects, snakes and other reptiles and sometimes other birds. May kill young chickens on occasion. Voice is most harsh and unpleasant. Plumes are shed annually. Some yield feathers sought by trout-fly makers	Food mostly seeds such as German rape and canary seed with some cuttlebone, and for caged birds some yeast occasionally. 1- to 2-year-old males are best breeders, with female possibly a bit older. Cage for a pair should be at least 16 by 18 inches.
ECONOMIC IMPORTANCE	Usually quarrelsome with other poultryyard birds, and are usually noisy and wild. Flesh is dark and much like game bird flesh, but may be popular; in past was exceedingly so. Its second appearance in Europe was about sixteenth century. Early Romans favored it for feasts	Markets for turkeys seem to be steadily on the increase, along with the price they bring. In some states the birds are killed and processed on the spot, being shipped, either canned or frozen, in usable form. Big states are California, Colorado, Iowa, Illinois, Missouri, Texas, Ohio, Minnesota and Pennsylvania	Raised as ornamental birds where range and temperature is suitable. In early times were considered a banquet tidbit where the brains were particularly cherished. Formerly thought to be an emblem of immortality. They were the favorite birds of Juno, whose chariot peacocks drew	Canaries are bred for various song types or even for tricks. Some are also bred to produce unique plumage and form and color. Some have crests, some feathered feet. Feeding of cayenne pepper is supposed to influence color. Birds first imported into Europe early in the sixteenth century.

COCKATOO	MACAW	PARROTS	LOVEBIRD	MYNAH
Kakatoe, sp. *et al*	*Ara* sp.	*Psittacus* sp.	*Melopsittacus undulatus*	*Gracula religiosa*
Species figured is *K. galerita*, the sulfur-crested cockatoo. It is white with a snowy, sulfur-yellow crest. Other species include the pink or Leadbeater cockatoo, which is white with pinkish neck and red, yellow and white striped crest. Both birds belong to the same genus *Kakatoe*.	Gaudy, long-tailed parrots. Blue and yellow Macaw, *Ara ararauna*, 2½ feet long, bright blue above and yellow beneath. Red and blue Macaw, *A. macao* to 3 feet long with 2-foot tail, vermilion above and below, with yellow-green, blue and scarlet. Green and red Macaw, *A. militaris*, to 27 inches.	True parrots have tails that are square or rounded at the tip. *P. erithacus* the gray parrot is about 1 foot long, with scarlet tail and general ashy-gray color. Green or Amazon parrot is about 1 foot long, shining green with blue-purple forehead band. It is *Chrysotis amazonicus*. Toes, 2 in front and 2 behind.	A small parakeet with characteristic *pointed* tail. Length about 8 inches, of which one-half is tail. Tail with bluish central feathers bordered by blue-green feathers. Most of the upper parts of the body, wings, neck, head and cheeks gray with alternating markings of blue and of green crescents.	Length about 9½ inches, or larger than a robin. Upper body parts brown to ash-gray. Primary wing coverts, pure white, tail, blackish-green, white-tipped. Belly and under tail coverts white. Chest dark ash. Sides brown with ash. Head greenish-brown. Cheeks white. Legs yellow. Sexes colored essentially alike.
The Indian Ocean area and Australia is the home territory of cockatoos as follows: sulfur-crested is to 20 inches long, comes from Australia; great black cockatoo is to 31 inches long and comes from northern Australia; Leadbeater's comes from southern Australia.	Native of area from Paraguay to Mexico and in Cuba, the red and blue ranging from Central America to Bolivia; the green and red from Mexico to Peru and Bolivia. The Cuban macaw, *A. tricolor*, has been practically exterminated. The others have been perpetuated in zoos and gardens.	Festive parrot, *C. festivus*, to 16 inches long is green with narrow, red, frontal band and eye streak, blue above and behind eyes, lower back vermilion, greater quills with blue outer webs and greenish-black inner webs. It hails from Amazon jungles, and, with gray parrot, was generally imported heavily.	Native of central and southern Australia, with the breeding area to the south. The African *Agapornis* and the South American *Psittacula* are also cage birds, known commonly as lovebirds. Of these, the rosy-faced lovebird, *A. roseicollis*, is about 6¼ inches long, green-yellow beneath; blue, above.	Mynah figured is *Gracula religiosa*. Indian mynah discussed is *Acrido-theres tristis*. Most mynahs of Asiatic origin and in some parts of world are considered useful insect destroyers. Abundance may vary greatly locally and through years. In some cases cannot survive competition with starlings.
There are at least a dozen species that, in wild state, nest in forested lands in hollows in trees. Eggs may number to 20, but are more commonly 7 to 9, and incubation is about 17 days, during which hen is fed by cock. Young are downy when hatched and both parents assist in rearing 2-4 broods.	Nest in hollow trees, the hen laying two eggs as a rule and the incubation being by both birds. They are frequently kept in houses or chained in gardens in tropical regions. They climb about trees, using their bills, and rarely come to the ground. Flight is direct and not usually elevated.	Parrots mate for life, nest in holes in banks or in trees, although habit varies with the species. The 2 to 8 eggs are incubated at the parent's body temperature of 106° F. for 25 to 30 days, and the young are cared for carefully by parent. Birds are generally long-lived.	With the Australian lovebird in captivity, birds nest in round-bottomed boxes, two nests per pair, with opening towards light. To 6 eggs laid with 17-day incubation beginning with laying of first egg and incubation by female only, although male assists in bringing food.	Nests in holes in trees, in buildings or walls. Shapeless mass of straw, feathers, rags, twigs, twine and junk with fine warm lining. Eggs 4 or 5, 1-1/5 by 4/5 inches, oval to pear-shaped, glossy, spotless, pale blue to pure sky blue. Female incubates while male struts, bows, swells and screeches his harsh song before her.
Food is largely nuts, fruits, seeds and even bulbous roots, which they dig with their powerful, hooked beaks. They may injure trees by stripping off the bark but they do not eat the bark. They are noisy or contented depending partly on conditions they must face.	Food is entirely vegetable, such as nuts, and hard seeds, all of which they are able to break with their powerful bills. They haunt forest borders, are commonly seen in pairs or in small flocks. They are noisy, screaming either on perch or on the wing.	Young parrots in captivity eat bread and milk but mature birds eat crackers, fruits, vegetables, seeds and a considerable variety of foods. Success in keeping birds in captivity depends largely on ability to keep birds clean and with ample fresh air. Since there are about 100 species conditions vary.	Can go without water for months but needs it badly at times. May nest 3 times a year and a 14 x 9 x 7-foot aviary may care for 8 happily mated pairs. Young may breed at 3 months. Food, seeds like millet must be larger than the common bird seed suitable for use with canaries.	Walks on ground like a starling, which it resembles superficially. Does not hop. Song highly varied and may be imitative, some cage birds giving good imitation of human speech. Food, for most part, insects, particularly grubs, but may be largely valuable fruits. In wild may form large, aggressive, noisy flocks.
Relatively common as cage birds in the past but, due to their carrying of fatal parrot fever, are now not popular and their importation is practically stopped. In captivity they may be fed fruits, oats and similar plant materials but they have large appetites and are expensive to maintain.	Some macaws become greatly attached to those who give them care and provide them with food. Because of this they are often treated as pets. More commonly they are seen by most of us in huge cages, about which they climb with grotesque skill and to our great enjoyment.	Parrots and parakeet carry parrot fever that may be fatal to humans and therefore importation of birds has been practically stopped. Disease may be spread by simple contact with bird or with its cage. Parrots may learn to imitate human speech and laughter, but tongue splitting is unnecessary.	Since the birds may be carriers of psittacosis or parrot fever importations are now illegal or highly restricted. Popular as cage birds because of ability to learn tricks, because of apparent affection shown between members of a mated pair, and because of the remarkable beauty of the plumage.	May rank as pest in wild. In some parts of world they eat apples, pears, peas, peaches, plums, strawberries, gooseberries, apricots, raspberries, and other fruits. As cage birds mynahs have staunch supporters in their owners, and as wild birds they have confirmed and determined enemies.

COMMON NAME SCIENTIFIC NAME	EMBDEN GOOSE *Anser cinereus*	CHINESE WHITE GOOSE *Cygnopsis*	TOULOUSE GOOSE *Anser cinereus*	SWAN *Cygnus mansuetus*
DESCRIPTION	Adult Embden gander may weigh to 20 pounds, while adult goose may weigh 2 pounds less. Entire plumage is pure white, and the wings are large, strong and well-rounded. Sexes are alike and young resemble adults in plumage. Shanks are long and deep orange. Eyes are blue.	Adult gander weighs to 12 pounds, and adult goose to 10 pounds. In addition to the white breed here considered, there is a brown breed, which is dark grayish-brown. Sexes in each are colored alike. Head is characterized by having an orange knob at base of the bill. Bill is stout, orange, medium.	Adult ganders weigh to 26 pounds, with adult goose 6 pounds lighter. Sexes colored alike, gray above, with under parts lighter to white; wings gray with lighter tips, and tail gray and white. Toes are straight, reddish-orange. Shanks are stout and eyes are large and brown.	Mute swan is *C. mansuetus;* of which there is a black and white variety, while whooping swan is *C. cygnus,* has yellow base to bill and before eyes. Whistling swan is to 55 inches long with yellow before the eyes, and trumpeter swan *C. buccinator* is to 65 inches long. Sexes are alike.
RANGE AND RELATIONSHIP	Breed was developed essentially in Germany, and is more popular there than is the Toulouse goose of France. It, like the Toulouse goose, was probably derived from the native, gray, lag goose. The whiteness of the feathers make it attractive to some, but it does not attain the Toulouse size.	Native of China but widely introduced through the world, largely as an ornamental breed. Another ornamental breed includes the Egyptian goose, which is ferocious, wild and grayish-black to brown. Chinese geese stand erect and walk with conspicuously arched, long necks.	Gray or lag goose is found in most European countries from Lapland to Spain and Bulgaria, and east to China. This breed is developed in southern France, where it is raised in large flocks. This breed is probably popular over more of the world than is any other breed of geese.	Mute and whooping swans are European; whistling and trumpeter, American, with mute the domestic bird. Necks are exceptionally long and sinuous; legs short. Color is almost wholly white. In Queen Elizabeth's time privilege of keeping swans was a royally granted one.
REPRODUCTION	Eggs of Embden geese weigh from 4 to 5 ounces, being larger than those of the Chinese geese. They may be incubated under a hen, beginners putting about 6 under a hen. Incubation is 28 days, or thereabouts, and the goslings are creamy white and downy when first hatched.	Eggs are white and weigh from 3½ to 4 ounces. Nest is made in a box or similar shelter that has been feather-lined. After 28-day incubation creamy, downy goslings are hatched that do not require food for 36 hours. At age of 3 weeks the goslings may be turned to pasture and independence.	Eggs are laid in nest lined with feathers. Each egg weighs 4 or 5 ounces. Goslings are downy, gray above and creamy below, and when first hatched must be kept dry, even to the extent of keeping them away from dew, if best survival is to be attained. Incubation is about 28 days.	Probably mate for life. Nest increased during egg-laying and incubation to 2 feet high and 6 feet across, sometimes. Eggs, 2 to 6, are greenish-gray. Incubation is by both parents for 35-40 days. Young are known as cygnets, and in early days were caught and marked on bill in July.
HABITS	Young geese may attain some independence by 3 weeks when they may be turned out to pasture, after which they may do well with one supplementary feeding, or with no such special feeding, depending on the nature of the terrain and the natural food available. Young are protected by both sexes.	Laying birds are usually fed a special mash of bran, cornmeal and meat scraps but most adults can glean a living, at least in summer, from an ordinary pond or field where chief food is just plain grass. In winter geese are fed grains and the ordinary foods common to poultry.	Food in temperate weather may be gleaned by geese from the average field and include grass and some grain. Winter feeds must include some grain and silage for roughage. The wild gray lag goose lays 6 eggs. The name lag derives from tendency of geese to lag behind the bird that leads away.	Require some privacy and so need large ponds during breeding period. Require green food the year round, but are usually fed wheat, buckwheat, barley, bread and similar foods, including even soaked dog biscuit. In early England, swans were known as bird royal.
ECONOMIC IMPORTANCE	Geese like the Embden geese are raised primarily for their food and for their feathers. Some geese are raised solely for the fine feathers of the head. These are used as powder-puffs. The skin bearing these fine feathers is tanned with the feathers still on. Geese may be powerful fighters.	These birds are not so large, so easily raised, or in other ways so satisfactory for domestic use as are the Embden geese and the Toulouse geese. They are favored by fanciers who are interested in show birds, but can hardly be considered even then of great economic importance.	This is the great goose-flesh producer, their size making them popular. They are herded by a regular goose herder in the old countries, and are driven to and from pasture and to the final market. Toulouse geese are usually less wild than most other breeds.	Males may fight vigorously any intruder, and may mourn loss of mate for long time. Have been kept more as ornamental domestic birds than for their food value, their pugnacious habits making it difficult to raise them with other domestic birds.

PEKIN DUCK	RUNNER DUCK	ROUEN DUCK DOMESTIC MALLARD	HOMING PIGEON	POUTER PIGEON
Anas platyrhynchos	*Anas platyrhynchos*	*Anas platyrhynchos*	*Columba livia*	*Columba livia*
Drake weighs to 9 pounds, duck to 8 pounds. Feathers all white to creamy white. Shanks and toes red-dish-orange. Bill orange-yellow. Eyes lead-blue. Head is long and neck of medium length and arched. Tail is somewhat erect, and has a few curled feathers above. Wings are short. Body heavy.	Drake may weigh to 4½ pounds, duck to 4 pounds. Sexes are colored alike, there being a number of varieties such as fawn and white, white and penciled. The breed is characterized by the slender build; erect carriage; long, wedge-shaped bill, which is yellow-green with a black tip.	Drake weighs to 9 pounds, duck to 8 pounds. Sexes differ much in coloration, the male having green head, gray-brown body, with a white ring around the neck. He also has curled feathers at base of top of tail. Female is rather uniformly brown, with dark bill and no white collar or green head	Length usually under 15 inches. Racing bird should weigh about 1 pound. Carrier pigeon is a fancy breed not used for carrying messages as is the homing pigeon. Colors vary from blue to gray to brownish to white. Base of bill with swollen membrane around nostrils.	Length to 20 inches, although some are no more than 14 inches. Thigh to middle toenail to 7½ inches. Colored blue, black, red, yellow or white, but usually with 2-inch-wide, white crescent across the enormous crop, the nature of this crescent being important to breeders raising birds for show purposes.
Developed in Asia from the wild mallard, but is popular throughout the world wherever conditions are suitable for raising ducks as poultry under domesticated conditions. It is particularly popular near large cities where there is an established market for rapidly grown young ducks.	Breed originated in India and is raised primarily for egg production. In this respect, it compares with the Mediterranean breeds of poultry such as the Leghorns, Minorcas, Anconas, Spanish and Blue Andalusians. With some poultrymen the runners, or "Indian runners," are very popular.	Developed, of course, from the wild mallard, and is found almost anywhere in the world where food and water conditions are at all suitable. Other closely related domestic breeds include the all-black Cayuga duck, the gray and white call duck, and the large white Aylesbury duck. Many interbreed freely.	Some 200 varieties of pigeons are recognized. Homing pigeon probably developed from rock dove found wild in Europe and Asia and northwest Africa. Stock dove, *Columba aenas*, may have contributed to ancestry of domestic pigeon, but it is doubted. Were used by Romans in Middle Ages and by Asiatics.	Among the various fancy breeds are the carrier, king, fantail, the tumbler, the barb and the pouter, of which the pouter may be the farthest removed from the original rock dove. King pigeons are raised for use as meat, the flesh being best in the young squabs. Some breeds so unusual they cannot fly.
May lay to 128 eggs a year, the eggs being white and averaging 3-3½ ounces in weight. Eggs are laid in nest boxes under domestication. Incubation by the rather poor mothers in about 28 days, unlike Muscovy ducks, where it may be 35-37 days. Young ducklings may reach weight of 8 pounds in 8 weeks.	Eggs weighing from 3 to 3½ ounces are laid, a duck sometimes laying well over 120 eggs a year, these being relatively large for a small bodied duck. Incubation is for 28 days. Young and old ducks require ample shade in some territory. After the first month most ducklings are able to feed selves from range.	Promiscuous breeders in which male is selfish. Eggs, numbering 14 or more, are 2 to 2½ inches long, yellow-white to greenish and usually dirty. Incubation by female only for 26 to 28 days. Ducklings are down balls of fluff that follow mother until they are reasonably developed	Monogamous. Nest in box lined with sticks or straw. Eggs, two, white, laid 8 to 12 days after mating. Incubation by both parents for 16 to 18 days, the cock during 6 hours of daytime and hen during the remainder. Young fed pigeon milk from parents' crops for 5 days. May live 10 years.	Life history essentially as described in column on the homing pigeon. The pouter inflates its chest when strutting, and for judging purposes must carry the middle toes turned outward. Much weight is given to the proper feathering of the limbs by fanciers.
Ducks require room, and range must be cared for since their droppings are filthy. Young ducks are often hatched by hen and kept from water for some weeks. After 1st month young can care for selves adequately. When forcing, growth mash soaked to a slop is commonly used. Grit should be available.	Feed is about same as has been suggested for other breeds of ducks; first week 5 times daily a mash of 2 parts bran, 1 part cornmeal, 1 part middlings and some green matter. Later cornmeal is increased and meat scrap is added. By 4 weeks, the feeding may be cut to 4 times a day.	Are fed twice daily a mash of middlings, cornmeal and green stuff, with meat scrap and oyster shell added now and then. Ducklings are fed 5 times daily during the first week, tapering off in range ducks to independence by end of first month.	Food grains such as wheat, buckwheat, peas or cracked corn. Training for flight by young begun at distance of 1 mile, with a mile a day added until 25 miles is reached. Then may be jumped to 50 miles. Hens are best travelers when eggs have been in nest 10 - 12 days. Cocks best when rival is suspected.	Pouters must have a dignified walk while the crop is inflated, and must not choke, jump or raise rump feathers while walking. Instead, it must hold head and feet in a perpendicular line while strutting. All of this is, of course, in accordance with standards set by judges.
Pekin ducks are raised primarily for their superior flesh. Young ducks known as "roasting ducks," or "green" ducks, bring a high price. Feathers provide a supplementary income, and eggs are of a superior food value, and are unusually large for a domestic bird.	Male gives a low *quak* call, while the duck gives a loud *quack*. Ducks are valuable poultry in communities where there is a demand for their eggs or flesh. They often require more care than chickens, and possibly more protection from vermin, but they have their defenders at all times.	Raised primarily for flesh, although some mallards are raised for freeing as game. However, the Rouen is too heavy to serve in this capacity and may not be considered here as a game form. If so considered, they might as well be shot in the barnyard as in the field so far as sporting qualities are concerned.	Used during war for carrying messages. Can speed 1200 yards a minute and have been known to fly 2600 miles to reach home. Can maintain high speed for 13 hours. Home may be on a moving ship and yet it may be found. Racers usually bred from February to September and then rested.	Pouters are, of course, show birds, and the values set by man are wholly artificial and to a great extent impractical. The real contribution to man's interest is made by the homing pigeon that carries messages and by the king pigeon that gives us flesh to eat.

(Continued from page 427)

we now have pigeons that could have been developed only through the whim of man, coupled with his knowledge of how to make other organisms do what he wishes them to do.

This influence of man is, of course, obvious in the barnyard birds, which he has controlled for generations. We have already developed some appreciation of the different kinds of chickens, but have not adequately considered the ducks, swans, geese, turkeys, guinea fowls and peafowl. Some of these groups have yielded well to demands for specialization. Others seem to have resisted it equally well. We have ducks that have become both famous and valuable because of the large number of eggs they lay. Where there is a good market for duck eggs, these birds have merit. Other ducks yield a maximum of flesh in a minimum of time, and with a minimum expenditure of food and of care on the part of man. These find a welcome where duck flesh is popular. The same holds for the geese, among which we have some breeds that efficiently and quickly produce superior flesh, while others produce superior feathers.

In all of these cases, geography and established likes of man have to be recognized. The climate of some parts of the earth may be more suitable to the success of a given breed of waterfowl than elsewhere. The result is that those breeds that can succeed under certain limiting conditions are popular where those conditions prevail. Other breeds may be equally popular where different conditions suitable to their needs are to be found. One of man's greatest weaknesses is the stubbornness with which almost any man thinks that the rest of the world should live as he does, overlooking completely that others live in different environments where the conditions for success are different, and that others may have fundamentally different needs. We have geese that are popular in Germany, while others are equally popular in France; ducks that succeed in northern Asia, and others that do best to the South; turkeys that bring better prices in the western United States than do others that bring top prices in the East. Brown hen's eggs bring top prices in some cities, while other communities accept or welcome only white eggs. In most of these cases there is no intrinsic difference in the values of brown or white eggs; bronzed or white turkeys; gray or white geese; white or brown ducks. Yet, in spite of this, men have set standards that determine directly what kinds shall be raised in a given place. These standards determine what birds shall breed with what other birds, doing so as effectively as the gilded bars that separate two canaries, which might enjoy each other's company if Nature were allowed to rule.

Where there are great economic issues involved, these standards set by man will be, and probably should be, determining factors in deciding what domestic birds shall feed freely on the grains that we may raise. If one breed of ducks can produce more flesh and eggs than another breed that eats the same amount of grain and mashes, then it is obvious which breed will have the opportunity to breed. The barnyards of our grandfathers, where Minorcas, Leghorns, bantams and Plymouth Rocks ran, fed, fought and bred together, are no longer to be found as commonly as before. Similarly, the pigeons that flew freely from farm to farm no longer find this possible, at least if they are being reared for economic purposes.

Some men seem to carry their influence on other creatures to extremes that may be difficult to explain. Some of us decry modern art that resembles nothing to be found in Nature, and that can serve no obvious purpose. Similarly, we may have to wonder at some of the absurdities that have been developed by those who breed domestic birds for show purposes rather than for flesh, eggs or feathers. A poor pigeon that cannot fly, can walk only in a manner dictated by arbitrary human judges, that must bear its feathers in but a single pattern, obviously cannot be considered as a free agent in our modern society. Neither can it be considered as a valuable addition to our forces concerned with the production of food for human consumption.

We hope that we will never have a completely rational world organized solely for the purpose of human profit of a financial nature. I miss the peacocks I used to see as a youngster on a farm near my home. I admire a local merchant who raises swans on his ponds for the fun of it, and because of their regal beauty. I wish everyone could have the fun of hunting guinea fowl nests in the field back of the cowbarn. I wish these things simply because they all have given me pleasure at some time in my life. And I recognize that many of these birds are not worth their salt if we must think in terms of dollars and cents. There is no doubt but that, as time goes on, man will learn new things that make domestic birds yield greater returns than they now do whether this is in eggs, feathers, song, or behavior. Witness the wingless hen. I am reasonably sure that we will make more bars for our bird cages than fewer, and I am afraid that many of these bars will be gilded by economic demands. For this reason, I rather think that domestic birds that now live in some sort of gilded cage will find a future in which their natural whims and desires are more circumscribed than before, and that freedom to them is not to be expected.

Yucca

By DANIEL SMYTHE

Tall spire of beauty, against the storm,
Your quiet confidence takes form.
The yucca plant is now in bloom
Against the dark sky's windy room.

As We See It

Conservation by Conference

DURING the latter part of August we went to Lake Success, New York, to attend the sessions of the International Technical Conference on the Protection of Nature, and the United Nations Scientific Conference on the Conservation and Utilization of Resources. Also, for two days, we took a quick trip to Boston for the sessions of the Ninth Eastern States Conservation Conference.

The conference on Nature protection was called by UNESCO, with the cooperation of the International Union for the Protection of Nature. The other conference, known briefly as UNSCCUR, was convened by the United Nations on instructions from its Economic and Social Council. The Boston Conference was called, unfortunately simultaneously, by the Council of State Governments and the Massachusetts Commission on Interstate Cooperation.

A complete report on these three meetings would require volumes, and the proceedings and voluminous papers of the first two, at least, will eventually be available. Indeed, it would seem more appropriate to attempt here a brief evaluation of these meetings as they fit into the whole scheme of conservation thinking.

UNSCCUR was the largest meeting, bringing together representatives of forty-four countries. Its section meetings were devoted to fuels and energy, water, forests, land, wildlife and fish, minerals, education for conservation. It treated with many special subjects falling under these general headings, both in section meetings and in plenary sessions.

This was a meeting largely concerned with the utilization of resources. Its approach was essentially exploitative. Its conservation thinking was of conservation for use only; esthetics or preservation had little part in it. Furthermore, by some ruling from on high and for diplomatic or other reasons, the conference took no action, arrived at no conclusions, made no recommendations for the future. Perhaps this course was essential, but it had the effect of leaving many in attendance with a certain feeling of futility.

Although smaller, the International Technical Conference on the Protection of Nature, seemed to us to get farther. Perhaps it had an advantage in not taking in as much territory. Its concern was with area and species protection. It was dedicated to furthering the preservation, for esthetic or scientific purposes, of areas throughout the world that are outstanding — as are our National Parks — and should be given defended status before exploitation makes it too late. The protection conference was concerned with endangered and vanishing species of birds and mammals, with such threats to fauna as high-powered insecticides and other "miracle" chemicals, with broader conservation education, and other subjects directly related to protection as a part of the educational, scientific and cultural future of the peoples of the world.

The Nature Protection conference came to conclusions. It adopted a group of carefully considered resolutions calling upon UNESCO, or the International Union, for certain definite action. It seemed to us to get somewhere.

It is, of course, difficult to point to such international assemblages and say that this or that was definitely accomplished. Actually, the results will gradually crystallize; some slowly, some more rapidly. However, one of the great benefits from such meetings derives from the personal contacts; the corridor and lounge discussions among individuals from far distant parts of the world; the creation of a personal entente among leaders. If only for this contribution, both international meetings were justified, albeit the sessions themselves were at times dull, at other times stimulating.

Against this background of international conservation thinking, we must say a word in evaluation of the Boston conservation gathering. There the thought was exclusively from the State point of view, seasoned with the philosophy of inter-State cooperation as providing the solution of such conservation problems as forest fire control, pollution control, fisheries management, recreation, pest control, wildlife management, and other issues.

It seemed to us that this Boston meeting was designed primarily as a backfire against a Federal or regional approach to conservation problems of restricted scope, such as pollution abatement. There was, for example, a liberal amount of tub-thumping for State handling of this problem, by individual States or by inter-State compacts. There was much gilding of the lily of accomplishment in pollution control; laudable goals were described as though they had already been achieved, which largely they have not. Renewed allegiance was voiced to fractional conservation policies of a sort that have long delayed real progress.

Conservation needs are not bounded by the Connecticut, the Hudson, the Delaware, or the Potomac; they do not, indeed, stop at the shores of the Atlantic or the Pacific. We need to think of our renewable natural resources in terms of the world. The Lake Success meetings emphasized this; in reverse, the Boston meeting underlined it.

Little "D" was one of the twin sons of "Bambi," who deserted him and left his rearing to a human foster mother, to whom the youngster became devoted.

Eagle Harbor's Deer Citizens

By KATHERINE M. GILLETTE

Photographs by Ray Forster

PARISHIONERS of the historic little Catholic church were gathering for mass. Most of them were in their pews when a little doe walked daintily down the aisle toward the altar, just as the priest appeared to begin the service. Startled, at first, by this new member of his flock, he smiled and said, "I shall have to ask that Bambi be taken out before we begin the mass." So, with much coaxing, the deer was urged out of the church to the shady side of the building, where she often rested. At least she had tried to "get religion."

This was only one of the many incidents that endeared this doe to the natives and summer visitors of Eagle Harbor, which is on a narrow, rugged point of land lapped by the blue waters of Lake Superior, in Keweenaw County of the Upper Peninsula of Michigan.

Bambi, as she had been immediately, although not with great originality, christened by the Harbor's children, came from farther south. A Finnish farmer and his wife, hearing a continuous barking of their dogs, went to investigate. They found the dogs excited about an injured fawn. The farmer bound the orphan's wound and carried the fawn home. It wintered in the barn with the cows and dogs, and in the spring, completely recovered, was released as the law requires.

Then the trouble began. The deer found the lush young seedlings in gardens perfect and easy fare. She roamed widely and complaints were numerous. So the local conservation officer suggested that the doe be taken to the north end of the peninsula, which is not farming country. That is how she came to Eagle Harbor, for she wanted human companionship and found it there. She made friends with every family, particularly the children. She would wait at one door or another to walk to school, or would turn up at school to walk home with some special friend.

"Bambi," grown from fawn to doe, with one of her many young friends.

Bambi quickly learned the customs of the region. The village mail always came by

truck at about noon. The deer never missed this event. Just before noon her grazing was always in the direction of the village store where the post office was. As soon as she saw people gathering for the mail she would bound gracefully up the twelve steps to the store, sure-footed as a mountain goat, and slip through the door at the first opportunity. The storekeeper, busy at such a moment, could not provide the usual handout for Bambi, but she took care of this herself, choosing a potato from the bin, an apple from the basket, or, best of all, a cookie. Onlookers always enjoyed this pilfering.

Lighted windows were always a challenge to the doe, and she developed into a sort of "Peeping Tom." Her first visit to us was such an occasion. The lights were on and pine knots were blazing in the fireplace, and at the window was Bambi, head up, ears erect, nostrils quivering. After a long look she tossed her head in a satisfied way and went back to grazing, later deciding to sleep that night beside our house and stay for breakfast.

One August day the deer was lunching on rose hips from the wild bushes, with occasional longing looks toward us in the living room. Someone suggested we let her in, and she was in like a flash when the door was opened. After a greeting all around, her literary instincts got the better of her. Or perhaps it was the bright color on the cover. Anyway, she helped herself to a copy of *Time*, discarding it when she found that it lacked the flavor of the rose hips. Getting her out was no small task. She stiffened her front knees and planted two hooves firmly, exactly like a mule. Coaxing and a raisin cookie finally prevailed and she left.

"D" gets acquainted with another baby.

The deserted fawn and its foster mother, who saved its life and reared it to health on a bottle.

"Bambi" and "Bino," the second twin whom the doe favored over the frailer "D".

In October, as we were leaving the village for the city, we saw Bambi on the bank of the creek. Across the creek was a handsome young buck, his antlers still in the velvet. Romance was in the air. Also the deer season was approaching and the doe's friends, knowing her complete lack of fear of man, were doubtful of her future. Does are protected, but careless or heedless hunters go into the woods in the deer season. However, one of Bambi's Eagle Harbor friends kept her in his garage during the open season just to be sure.

We kept in touch with the deer during the winter through occasional visits to the Harbor. We learned that Bambi's sleeping quarters were a snow bank back of the barn. This led us to examine her winter coat, with its furry underlayer so thick that our fingers could not touch her hide. One of our trips was in early March, when ice cutters were at work. In their midst was Bambi, who left the workers to pay us her respects, then returned to the ice. Soon she joined a group of skating youngsters, trying to keep up with them although her feet went in four different directions on the glassy surface.

Before we left the village we stopped by to order some wood. In the woodman's kitchen the family of four was at the table, and between the two boys was Bambi, enjoying her bowl of soup, too. Near the table sat the young invalid mother in a wheel chair. When the deer finished her soup she looked longingly toward the "parlor." The father said, "Go on in if you want to," and Bambi cleared the mother's lap in one graceful and appreciative leap.

On July third of our second (Continued on page 452)

The Basilisk Lizard

By ALEXANDER F. SKUTCH

Among the many kinds of lizards that inhabit southern Central America, one of the most interesting is the basilisk. The biggest individuals, probably old males, are about two feet in length, grayish-green or grayish-brown in color, with a pale yellow stripe along each side. They wear a high, thin crest on the hindhead, another with a frilled margin down the middle of the back, and a third along the upperside of the basal half of the long tail. On somewhat smaller individuals, which seem to be females or younger males, the crest is confined to the back of the head, where it projects behind like the rudder of a boat, with perhaps a rudimentary crest along the back. Youngsters of all sizes, which form the bulk of the population, lack the crest.

Basilisk lizards dwell along the shores of rivers, lakes and lagoons in the warm lowlands, up to about 3000 feet above sea level. They like to sun themselves on rocks projecting above the water of rushing mountain streams, on logs stranded on the banks, or on the bare shores of lakes. From the waterways that are their headquarters they make excursions over neighboring pastures and lawns in search of food. Yet they rarely travel far from water, and if alarmed on one of these inland trips they scuttle at full speed back to the nearest shore, where alone they seem to feel safe. Keen-sighted, alert and usually distrustful of man, his approach generally sends them hurrying back to the friendly streamside. When running they use only their long hind legs, elevating the forepart of the body and holding the much shorter front legs above the surface of the ground. The long tail serves as balance.

The first sight of a big basilisk lizard scurrying over the water is an event long to be remembered. They run over the surface of river or lake much as they do over the ground, holding the forelegs up and using for propulsion only their strong hindlegs, with the long toes spread out over so wide an area that, moving at great speed, they do not break through the surface film. The tail drags along the surface of the water. The basilisks use their long toes to keep them above water much in the manner of those graceful tropical birds, the jacanas. But the jacanas, which walk deliberately over lagoons and sluggish streams hunting food, depend upon floating water weeds to sustain them; whereas the basilisks run so fast that the surface film of the water alone suffices to hold them up. When surprised on the bank of a stream, the wary lizards scurry across to the opposite shore, or to some islet or projecting boulder in midchannel. But if the expanse of water is wide and no floating log or emergent stump offers a haven of refuge, the canny basilisks flee back into the dense vegetation along the shore rather than take to the open water. If a fall into the water carries it beneath the surface, the basilisk can swim by kicking its hindlegs, much in the manner of a frog.

Basilisks are, at least in part, vegetarians. I have seen them eat the soft, sweet, white coat that surrounds the slippery green seeds of the *Inga* trees — the *guavos* so dear to the hearts of Central American children. Lacking a mill to process our coffee, we spread the freshly picked bright red berries to dry in the sun on top of a huge rock, inscribed with curious designs carved by Indians long ago, that rises beside a stream not far from the house. Here the basilisk lizards come to eat the sweetish pulp in which the twin coffee "beans" are found

But the most enterprising basilisk I ever knew was one that formed the habit of visiting a table set for the birds. The board was fastened in a crotch of a *Heliocarpus* tree in front of my house in southern Costa Rica. Here bananas or ripe plantains were displayed daily, and over a period of years attracted a growing number of birds of more than twenty kinds, including tanagers of nine species, five kinds of honeycreepers, three finches, two kinds of woodpeckers, visiting Baltimore orioles, and swarms of little wintering Tennessee warblers.

It was into this brilliant company that the basilisk lizard intruded, about four years after the feeding-table had been established. He was a fine crested fellow, although not of the largest size, and he lived along the stream that flowed fifty yards away. Several inches lacking from the end of his high-crested tail served as a mark of recognition. Easily he climbed up the twelve feet of smooth trunk to reach the board, where he lost no time in digging into the bananas, scooping out big mouthfuls with his broad jaws and consuming far more on each visit than any bird. His arrival would put the birds to flight, and so long as he remained on the board they held aloof, the boldest perching a few feet away and complaining. His hunger satisfied, he would disappear into the shrubbery on the bank below the tree.

The lizard's visits to the table began in October and continued into November. Then for about four months he stayed away. The following April his visits were resumed; the missing tip of the tail was evidence that the same individual had returned. He was not entirely welcome, for not only did he frighten away the birds, but he ate more than his share, and what was more annoying, with his blunt jaws he pushed the bananas from the table, which the sharp-beaked birds rarely did. Bananas were becoming scarce because the plantation was ravaged by the sigatoka disease, which killed the leaves and allowed the plants to produce only meager bunches, if they did not die before yielding anything. Hence I deemed it expedient to discourage the big lizard's visits. As shy as most of the birds, he would leave the table if he saw me approach over the lawn, and climb up a long, ascending branch where he was safely out of reach amidst the foliage. Then when I entered the house and everything became quiet he would descend and resume his feast.

A persistent pilferer, the lizard, although chased many times, returned again and again. Finally, one day when he had scrambled up the long branch and looked down at me as though in defiance, I shook the bough until he jumped from his high perch. The dense *Thunbergia* bush on the bank below broke the force of his long fall and he scuttled off, apparently none the worse for the experience — but wiser. After that he stayed away from the table, leaving the bananas to the multicolored birds, and to the bats and marsupials.

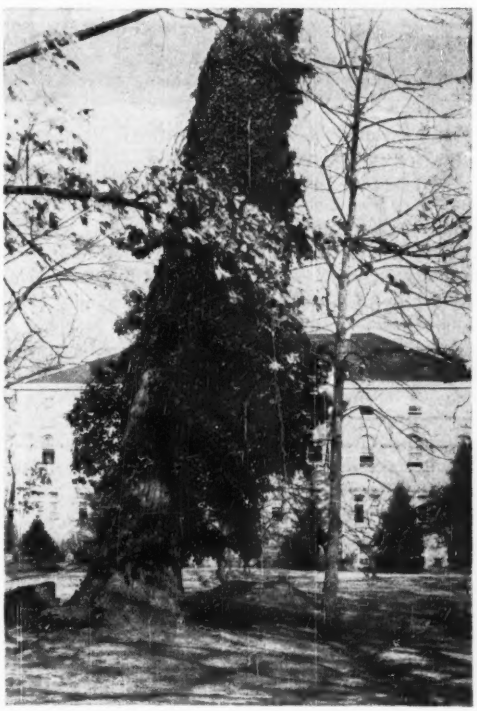
The Davie Poplar

By MATTENAYA ALLEGOOD-DAVIS

By Thee, O Tree, our great Apollo stopped
When for a divine season here he dwelt—
Jove in Elysium. O, Delphic temple,
For the empyreal ivy vestal
Whose Minervan notes the leafy Sibyl
Whispers! Then he lyred themes celestial—
Delphian themes for us to which we knelt.
Would now the gods walked! Would now
that they talked!

To Thee, O Delphi, come thy hopeful sons.
To Thee, O mecca of the faithful ones,
To Thee, O Tree, we come as to a shrine
Seeking now thy Sibylline aid—a sign—
An Aeolian whisper of Hope, Priestess,
From out of the Cimmerian darkness.

The Davie Poplar is the Class Tree on the campus of the University of North Carolina at Chapel Hill. When the tree was a sapling, in 1793, William Richardson Davie tied his horse to it when choosing the site of the University, which came into being through his influence. A Revolutionary hero of Pulaski's Legion, Davie was a member of the Constitutional Convention in 1787, envoy to France, master farmer.



So Goes the White-Wing

By JOHN B. HOLDSWORTH

★

The eastern white-winged dove reminds one of its vanished relative, the passenger pigeon. One reason is that it has the habit of migrating in large flocks, and the other that it is rapidly fading from the scene in Texas.

★

TWO THINGS about the eastern white-winged dove put us in mind of its vanished relative, the passenger pigeon. One is its habit of migrating in flocks, described as having once been enormous, and the other is the distressing fact that the dove has been rapidly fading from the south Texas scene.

The eastern white-wing is found most abundantly as a Texas breeding species in the lower Rio Grande Valley, and, of course, in the adjacent region of Mexico. It tends to flock together, even during the nesting season, and once great colonies were common in the densely wooded bottomlands. Like most gregarious birds, it is loudly loquacious — quite unlike the soft-voiced mourning dove. It utters a far-reaching, rising and falling series of crowing notes with great zest all day long, and one can imagine what a din would be produced by a large community of these doves.

Also one can try to imagine how spectacular a large flight of white-wings might be. It is a heavier bird than the mourning dove, although due to the shorter tail feathers it measures about the same in length. The white crescent in the wing flashes conspicuously in the sun and identifies the bird beyond all possible error. The tail has white and black markings similar to those of the mourning dove, and, during the period of courtship, this is displayed with almost the same show of vanity as that of a turkey gobbler, with much bowing and puffing and posturing, and many wheezy "sweet nothings."

When the nesting season is over, the doves move about the country from one feeding ground to another, and then, in late September and through the first half of October, they commence the southward movement, which takes them to southern Mexico and Central America.

Now what has brought about the decline of the white-wing? It is no new story. The bird is simply the victim of advancing human industry in one phase of its career, and of insufficient protection in another. While the hunting season has now been reduced to a matter of a few hours — from four in the afternoon until sunset on three alternate days in some Texas counties, to be precise — the nesting grounds, those dense thickets referred to, continue to be encroached upon by an ever-broadening farming industry. The native brushland, which less than fifty years ago was an almost unbroken vastness throughout the Rio Grande Plains country, has been reduced in the southern vegetable and citrus growing area to blocks of a hundred acres, fifty acres, or less. There is a Federal Refuge of a little more than two thousand acres intended to make up for some of this loss. But not all is suitable for nesting, and it amounts to hardly more than a gesture in the right direction.

These circumstances are those found in what is known as the "Lower Valley," that lush, semi-tropical area occupying the two southernmost counties of Texas. In the next two counties up-river, there is not yet this great proportion of land in cultivation, and here we find an actual increase lately in the white-wing population. Here are the birds that have had their home grounds usurped and have moved on like many another wild creature has done in times past —

The white crescent in the wing of the white-wing flashes conspicuously and identifies the bird beyond all possibility of error.

crowded out by man's activities. The same thing may be noted on a lesser scale in other areas outside the main centers of white-wing population. In my own county at the northern fringe of the white-wing country, for example, there has been a noticeable increase in the last five or six years — noticeable mostly because there were practically no doves. Here, in busy little towns, the white-wings can be heard calling from all directions, and as the season progresses they will become more and more tolerant of human beings, like that other town dweller, the Inca dove. There is likewise a definite movement — and this is a sort of paradox — to the citrus orchards formed out of those same natural nesting areas of the white-wing. Here, perhaps, lies the one great hope of the bird.

Overshooting has heretofore played a number two role in the decline of the white-wing, but now that the main factor — diminution of habitat — is rapidly and irretrievably becoming a *fait accompli*, the hunting problem gains in significance. District Game Warden Charles G. Jones, who has supplied many of the facts and figures in this account, and who has himself several times gone to the newspapers on behalf of the white-wing, estimates a full forty percent of the birds killed are not recovered. "Around brush areas and grain fields," he explains, "many hunters who make a kill show no inclination to retrieve the bird, knowing that within a few minutes another target will present itself. So why spend the time to retrieve the one that has fallen some distance away and would take a little time in its location?" Therein lies the greatest loss from the hunting angle. The bag limit may be small enough — it is ten in 1949 — but those that are not picked up are not counted. The fact that the white-wing is still to be found in some very limited localities in considerable numbers works consistently against the bird. Sportsmen are apathetic. Those that see the doves at all see them in numbers sufficient for their immediate needs.

Still another factor in the decline of the white-wing stems also from the reduction of its habitat. Those confirmed nest robbers, the abundant grackles, and, to a minor degree, the exotic green jay, which in the normal state of affairs were simply a wholesome check on a large dove population, now exact an unnatural toll of eggs. Some biologists estimate only one and one-half young are raised per pair of doves, regardless of how persistently they repeat the nesting process.

This, then, is part of the story of the white-winged dove in Texas — the beginning of the end, or, perhaps at best, the beginning of a new chapter when the white-wing figures no longer as a game bird but will survive indefinitely as an interesting member of our avian fauna. It must enjoy such protection — and soon!

Orchard Wisdom

By PAULINE STARKWEATHER

An orchard is a rhythmic thing
With ebbing and with flowing,
And it is well, if one would sing,
To know what trees are knowing.
There is a time for blossoming,
And one for quiet growing.

A fossil colony of marine algae at the edge of a snowbank in the Medicine Bow Mountains of Wyoming. The rocks in which this fossil lies now stand on edge.

Are These Earth's Oldest Plants?

By CARROLL LANE FENTON

As AGE is measured in geology, the Medicine Bow Mountains of southern Wyoming are young. Barely ten million years have passed since they were mere hills surrounded by a rolling plain. Many of their cliffs were shaped by glaciers that vanished within the last 50,000 years.

Although the mountains are youthful, the rocks in them are exceedingly old. Some are altered, or metamorphosed, lavas; others are granites that cooled and hardened deep underground. Still others are marine deposits whose age is estimated at 1,420,000,000 years.

Of special interest are strata of marble southeast of Medicine Bow Peak. They began as beds of submarine ooze, which hardened into dolomite, a rock that resembles limestone. Ages later, the dolomite crystallized. It also was broken and stood on edge by upheavals that built a generation of mountains long since worn away. Only their roots now appear.

In spite of these changes, the marble preserves its original beds. At some times these were barren; at other times they were covered with colonies of simple water plants called algae. Unlike seaweeds, they grew close to the bottom, building up layers and irregular columns of stony material. Thus the algal colonies became solid, even while the plants were alive.

In some places the algae spread out in mats or crumpled sheets. In other places the algae formed massive domes, in which the layers resemble saucers piled upside down. Some domes are four to eight feet thick, but many are more than ten feet high and twelve to sixteen feet or more in diameter. They are the largest of all known fossil algae, and the oldest ones whose age is known with some degree of certainty.

Their great size has made these fossils a problem to collectors. Before a plant or animal can be named, there must be "type specimens" to show its essential characters. But who can collect fossil algae that weigh several tons? And what museum could accommodate ten or fifteen specimens showing their variations?

The solution has been a compromise. Fragments have been collected; fragments that show details in the structure of the entire colonies. These have been supplemented by measurements and photographs showing colonies that are much too large to be moved. They remain in the Medicine Bow Mountains, beside a rough fisherman's road leading to Lewis Lake. There the specialist must go to see them, finding them on alpine meadows and beside snowbanks that never melt away.

G.I. Birdman on Honshu

By WILLIAM R. EBLEN

Drawings by the Author

JAPANESE CUCKOO

COMING up over Mount Fujiyama, the sun changed the color of that great Japanese landmark from purple to gold. Then the full light of the day revealed the spectacular cap of snow on the dormant volcano. Japanese tree sparrows chattered on the roof above me, sounding rather like the English sparrows that carried on their avian gossip sessions outside my window in New England. This Japanese sparrow proved to be a local form of the tree sparrow of Europe, and it differed noticeably from the English house sparrow since both sexes sported a chocolate crown and a black cheek-spot.

The racket the sparrows were making swelled when Japanese crows joined in the noisy session. These crows were just as black in plumage and erratic in temperament as those 6000 miles away at home. The bird found around the A.A.F. base in the Tokyo-Yokohama area, however, was more the size of a North American raven than our common crow. The Japanese appropriately named him "Hasibuto-garasu," "the thick-billed crow," for the most obvious part of his imposing appearance. According to oriental legend, the crow is supposed to be seen or heard around the house of someone who is doomed to die. Both the bird and its color are considered bad luck.

GRAY STARLING

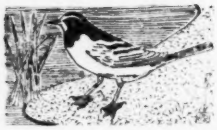
As I went to breakfast, a distinct whistling note overhead attracted my attention. I looked up just in time to see a large, brown bird sailing on outstretched wings in the graceful fashion so characteristic of kites. It was a black-eared kite, common throughout Asia, related to the black kite of Europe and to species found in the north of Africa.

This bird has its place in Japanese history, dating back to remote antiquity. Many books tell the story of the famous golden kite that appeared when the forces led by the First Emperor of Japan encountered Nagasunehiko's forces in Yamato Province. According to the legend, this majestic bird alighted on the Emperor's bow, radiating such light that it dazzled all who beheld it, thus rendering patriotic service by routing the enemy. The highest Japanese award for outstanding military service is called the Order of the Golden Kite and originated from this tale. The Japanese call the bird "tobi," and "tobi-iro" (the color of a kite) is one of their common terms for "brown."

BLACK-EARED KITE

Although I saw many birds shortly after I arrived as a member of the Army of Occupation, I lacked a native bird guide. Through a Japanese college student I met at the American Red Cross in Tokyo, however, I was able to locate a book store where I purchased a small volume, covering some 120 species. The text was limited, but the photographs and plates were good. I discovered that the climate in the Empire varied greatly, ranging all the way from subarctic to tropic. Thus the birds of Japan have a diversification of families as mixed as are the species of warblers during migration in the New World. Most of the Japanese species are related to those found in Europe, India, and the Malay Peninsula, and Japan has quite a few birds vastly different from those found in North and South America. Even so, by far the most fascinating part of my contact with the birds of Japan was the similarity I saw so vividly between the Old World varieties and the New World species I knew so well in America.

Japan, indeed, soon proved to be as much of an incentive to this amateur ornithologist as Lapland was to Linnaeus, or the Galapagos Islands were to Darwin. Since my knowledge of the native language was scanty, I had to depend almost entirely upon the Latin names for initial identification. When my observations proved that a bird new to me shared the well-known characteristics of one or another avian family, I truly appreciated the great contribution made by the roaming Swedish botanist and physician and his system of



JAPANESE WAGTAIL

classification. Also, I thought of Darwin and his appreciation of the relationship of living things throughout the world. The importance of his findings was obvious to me for the first time as I was now able to recognize familiar characteristics in heretofore unseen flora and fauna. As I traveled about in the strange land of Nippon, seeking new species to quench my ornithological thirst, I felt a certain kinship with those two great pioneering scientists.

Early bird acquaintances, permanent residents in southern Honshu and constant companions of the skylarks in the fields adjoining our air strip, were the Japanese bunting and the Japanese meadow bunting. The former was a bird of contrast, with dark green head, yellow throat and black mask. The other bunting was more rusty-brown, especially on the back and flanks. From a distance it reminded me of a white-throated sparrow because of the color of its throat, superciliary stripe and black eyeline. On closer examination the black earpatches and white malar stripe, with the black whisker mark, suggested the attractive face pattern of the lark sparrow. The undulating flight reminded one of the goldfinch, while the conspicuous white outer tail-feathers were like those of the junco.

EASTERN HOUSE SWALLOW

It did not take long to discover that two species of wagtails were common around nearby streams. Although similar, they were easy to tell apart at a fair distance because of the contrast in black and white they presented. The Japanese wagtail had black cheeks and a white throat, while the pied wagtail had white cheeks and a black throat. Both birds had the characteristic habits of the family they share with the North American pipits. Instead of hopping, they walked with a constant bobbing of the tail, as though the birds had picked up the military cadence from the drill field nearby.

Two bird episodes seemed to emphasize the mystical reputation of the Orient. One involved the brown-eared bulbul, which I was to recall whenever it rained, because of the deluge on the day I plodded across a large field to find out what was making so much noise in a nearby clump of small-flowered Japanese pines. I discovered "hiyodori," as the Japanese call the bird, flying back and forth nervously as I approached. It reminded me of the way bluejays seem to enjoy telling everyone in the vicinity that an intruder is nearby. The Japanese said the bulbul calls, "pee-a, pee-a," but to me, standing there in the pouring rain and watching the animated creature letting every living thing for miles around know that I was trespassing on someone's property, it sounded more as if the bird was saying, "see-yuh, see-yuh." I felt like yelling back in mock reply, "I know it, I know it." When I got back to camp, I learned that "bulbul" was a word adopted from the Persian and meant "nightingale"!

That same night was very warm in spite of the all-day rain. While I was trying to get to sleep, I heard a bird cry out from far away. It was a high-pitched call, which seemed to pierce the darkness with such a provocative sound that I had the feeling the bird was calling me outside to share the dim, moonlit night. The sound caught my fancy so much that I dressed and slipped out to search for the delightful midnight serenader. The sound originated from thick woods some good distance away, and this mystery bird was singing from somewhere deep within. Later I learned that the bird was a White's ground thrush, and that the Japanese believe the thrush calling out at night is "the voice of mischief." It certainly had succeeded in arousing my curiosity and in robbing me of much-needed "shut-eye."

As the weather grew progressively warmer with the advent of spring, almost every trip away was rewarded by the addition of several species to my ever-increasing life-list. One bright morning, as I plodded down a dusty lane in a small village on the outskirts of Yokohama, I heard a pretty song, similar to the cheery melody of the yellow warbler. In a nearby cherry tree in full bloom, I saw an animated version of a Japanese print. The Japanese white-eye, or "meziro," was flitting about in active warbler fashion, its olive-green upper parts, yellow throat and light chestnut flanks in the midst of pink cherry blossoms presenting a study in warm colors. The white eye-ring and plump, stumpy body, with the tendency to cock its tail wren-like, seemed to create the impression of a colorful court jester in the birdworld. It is interesting to note that, because this tiny mite is so often seen in flocks, the expression "meziro-osi" is used in Japan to

BROWN-EARED BULBUL

describe "a milling crowd." An interesting language!

Further on down the road of this village, I first encountered the more common Japanese swallow. As I walked by a house situated on the main trading street, I noticed a pair of these swallows zooming in and out of a small opening near the roof. Curious, I discovered that there was a nest full of fledglings on a rafter in the main room. The birds had been nesting there for many years and were accepted as a part of the household. This eastern house swallow, or "tsubame," differs from the familiar barn swallow of North America in having a white, rather than brown, abdomen. The fastest train in Japan is called, appropriately, "tsubame."

JAPANESE WHITE-EYE

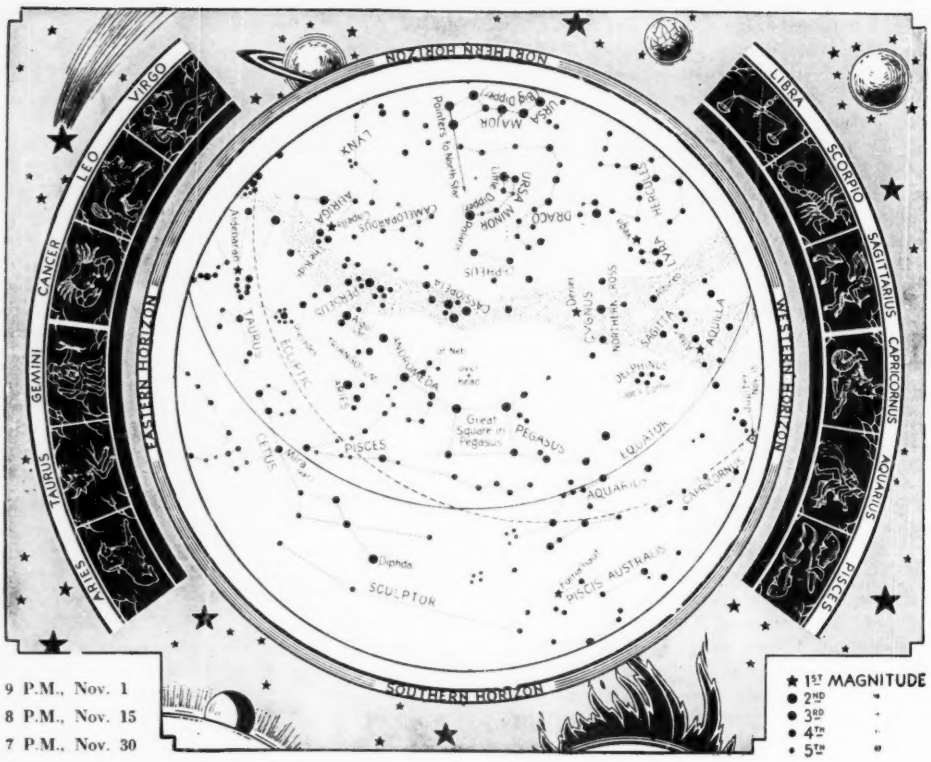
On a trip to the Base Hospital between Tokyo and Yokohama, I met a species of gull referred to in Japanese literature as "miyako-dori," or "bird of the capital," because of its association with Kyoto, the former capital of Nippon. As I was loading the medical supplies into our ambulance, I noticed a rather small gull flying up and down a river bank on my right. It proved to be the black-headed gull, whose crimson legs, feet, and bill contrast vividly with its snow-white body and pale, bluish-gray wings. I discovered later that, toward summer, the head of this species tends to turn blackish-brown. It was still in its winter plumage when I saw it, however, and the "yurikamome" appeared white as the lily, from which its name is derived. Another common species of gull was a little larger and reminded me of the herring gull, except for the fact that the white tail was marked with black bars near the tip. This black-tailed gull has a distinctive call like a catbird, and is called "umineko," or "sea-cat," by the natives. The bird is native to the East and has been a favorite of the fishermen since antiquity because flocks of them indicate the whereabouts of shoals of fish. One or two of their breeding colonies are designated as natural monuments, protected by national legislation.

Japan, like America, was plagued by a ubiquitous starling. The species, however, was the gray starling, but just as questionable in its habits as our familiar representative. It was a little more colorful, with its orange-red bill and legs, dark gray body and white rump.

Both tourists and natives alike have long acclaimed the scenic beauty of Kamakura, one of the leading seashore resorts on Honshu. On my visit to the famous shrine town, where the well known giant Buddha still sits Indian-fashion, I quite unexpectedly encountered the Japanese nuthatch. Attracted by the usual G.I. curiosity to a large crowd near one of the entrances to the biggest shrine in the village, I felt like Gulliver in the land of Lilliput as I peered easily over the heads of the throng at a scrubby looking Japanese standing beside two bird cages. A small bird in the cage on the left looked, from where I was standing, just like the white-breasted nuthatch that gobbled sunflower seeds from my winter feeding tray at home. This bird, however, had a bluish-gray cap, rather than the black one of the North American cousin. It also sported a black strip across its eye, a much smaller edition of the mask worn by the male northern yellow-throated warbler.

In the cage on the right was a miniature shrine, and as soon as I placed a sen coin between the nuthatch's mandibles, I saw the reason for the large audience. The bird flew into the cage containing the shrine, then through a pair of swinging doors into the tiny temple. Quickly the avian actor emerged again with a small piece of folded paper, tied around the middle with a single ribbon and secured on top by a bow knot. Returning to the perch in the other cage, the bird turned the paper around and around, in obedience to the number of times the owner tapped the side of the cage with a small stick. Then the tiny performer removed the ribbon by untying the knot, brought the paper charm to the side of the cage, and offered it to me by poking its bill between the wooden bars. All this was in response to a sequence of commands administered by taps of the owner's "magic wand." The whole act was an imitation of the procedure actually followed by the Japanese when they "feed the kitty" inside a shrine and obtain a charm from the Holy of Holies. I offered to purchase the "gozyukara" from the trainer, but he laughed and informed me that since it took so long to train the bird, which provided his only source of income, he could not part with it at any price. He was so worried, however, about offending me that he gave "G.I. Joe" another performance, free of charge.

The obvious scarcity of birds throughout Japan today, I was told, is the result of failure to enforce protective legislation. The damage thus done to the "balance of Nature" is far greater than the minor contribution bird meat makes to the over-all Japanese diet. Each individual hunter thoughtlessly adds to the present critical state of bird life throughout the country. For example, one day I spotted an elderly Japanese carrying a load of dead birds along a main road. Stopping my jeep beside him, I investigated the feathered creatures on his back. They were all of the same kind, reminding me of mourning doves. I offered to buy them, but the man refused to sell at first, insisting that they were to provide food for his family, and were the result of a full day of hunting. I made a deal, however, for some of the "yamabatos," as he called them. When I checked with my field guide, I learned that the "yamabatos," or "mountain doves," were really "kizibatos," or Eastern turtle-doves, a little larger than the European variety that winters in Africa. Preparing the bird skins as study specimens, I found the coloring of the plumage to be beautiful. The body displayed delicate gradations of pigment, ranging from a vinaceous gray on the head, neck and upper breast through a pale peach lower breast down to the white abdomen. The sides of the neck displayed (Continued on page 451)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

A New Survey of the Heavens

By ISABEL M. LEWIS

So much attention has been given to the giant, 200-inch Hale telescope on Palomar Mountain in southern California that one may overlook the fact that another great telescope, the 48-inch Schmidt photographic telescope, companion of the Hale telescope, is also atop Palomar Mountain housed only a stone's throw away from it.

The "Big Schmidt," as it is also called, is now employed in a four-year photographic survey of the heavens, sponsored by the National Geographic Society and the Mt. Wilson-Palomar Observatories. It will provide the world with its finest photographic sky atlas. Three-fourths of the heavens can be reached by this telescope and will be covered in great detail on about 2000 plates. These will show objects visible at distances as great as 300,000,000 light years. In 1953, if all goes well, this project will be completed, and copies of the sky atlas, which will be known as the National Geographic Society-Palomar Observatory Sky Atlas, will be available to observatories and other institutions at cost, which it is estimated will be about $2000 each.

The Schmidt type of telescope was invented about 1930 by B. Schmidt and was soon in great favor with astronomers. It has a reflecting mirror with a spherical instead of parabolic curvature, and there is a correcting lens placed at the center of curvature of the mirror. This correcting lens has a very slight curvature and is made of one thickness of glass. By means of this correcting lens the star-images are focused perfectly all over the plate. The usual type of reflecting telescope has only a narrow field over which the images will be sharp. They are affected increasingly toward the edges of the plate by a defect known as coma, which distorts the images. A Schmidt type telescope gives

images entirely free from coma, even to the edges of the plate.

The two great advantages of a Schmidt type of telescope are that it covers a large area of the sky and that it is very fast. Its focal ratio is f/2 compared to f/3.3 for the 200-inch telescope. A Schmidt telescope cannot be used visually because the image is inaccessible to the observer, being inside the tube and midway between the mirror and correcting lens. The film that receives the image at this focus has a radius of curvature half that of the mirror and is pressed down over a convex surface to give it the necessary curvature. Schmidt telescopes are also called Schmidt cameras, since they can be used only for photographic work.

The Big Schmidt on Palomar Mountain is the largest telescope of this type now in operation. Harvard has a 60-inch Schmidt under construction. There is a 24-inch Schmidt at the Warner and Swasey Observatory of the Case School of Applied Science at Cleveland, Ohio, and a 26-inch Schmidt in Mexico. Astronomers are enthusiastic over the performance of telescopes of this type for all types of research in which it is important to cover a large area of the sky on one photographic plate, showing clear sharp images and great detail.

The 48-inch Schmidt telescope on Palomar will serve, also, as a scouting telescope for the 200-inch, which is now having the slight bulge of a few ten millionths of an inch around its perimeter rubbed away, a process that is not expected to take more than six months and which is being done at the observatory on Palomar Mountain. In scouting for the great telescope, the Big Schmidt will search out objects that can be studied to the best advantage by its giant companion. Test photographs taken with the Schmidt telescope early this summer, preliminary to the initiation of the great sky survey now under way, have shown remarkable sharpness and great detail in regions of great star density, as, for example, in a portion of the Milky Way in the constellation of Monoceros. An enlargement of only a small portion of one plate depicts superbly a vast nebulous region centering in a great cloud of cosmic dust and gaseous matter illuminated by nearby stars and known from its shape as the Rosette Nebula.

Of special interest has been the discovery by Dr. Walter Baade, on plates taken with the Big Schmidt late in June, of a remarkable asteroid. This object is so tiny and faint that it is invisible in any but the most powerful telescopes. In size it is less than a mile in diameter. One might compare it even with a great meteorite, one of exceptional size, such as might have formed the saucer-like depression in Arizona known as meteor crater, although it is doubtful that this crater was formed by an object quite so large. The asteroid discovered by Dr. Baade is remarkable for the fact that it comes closer to the sun than any other known asteroid, and has a shorter period of revolution around the sun. At nearest approach to the sun it comes inside the orbit of Mercury, at a distance from the sun of only 22,000,000 miles. It also comes even closer to the earth than to the sun, a distance of about 4,000,000 miles at nearest approach. Its period of revolution around the sun is only 13.5 months, according to the latest computation of the elements of this tiny object: and so accurately are such computations made at so early a date after the discovery that the uncertainty in this period is less than a week. On September 1 it was of the 21st magnitude, which indicates that it was so faint that it was beyond the range of visibility of all but the largest telescopes. It was also at that time becoming fainter as it recedes rapidly from the earth and sun.

The number of the asteroids, planetoids, or minor planets, as they are variously called, has become large, especially since the great telescope at the McDonald Observatory in Texas, and now the Schmidt telescope on Palomar, are revealing the existence of tiny objects in our solar system, such as a fifth satellite of Uranus, another moon of Neptune and now a unique asteroid. The discovery of new asteroids may be expected in ever-increasing numbers. It was not many years ago that the number of known asteroids, ones for which orbits had been computed and that were recognized and named as members of the solar system, was about a thousand. The number of such objects has increased to 1604. There are undoubtedly many more of them. Some of them are objects of great interest. The greater number, by far, of the asteroids lie between the orbits of Mars and Jupiter at an approximate distance of 2.8 times the distance of the earth from the sun. There are many exceptions, however, as an examination of the orbits of these objects soon indicate.

The greatest asteroid in size, named Ceres, has a diameter of 480 miles. It was discovered on January 1, 1801. The discovery of the three next largest soon followed — Pallas, 304 miles in diameter, Juno, 120 miles, Vesta, 240 miles. No other asteroids approach these four in size. One hesitates to estimate the average size of the known asteroids, but it is probably well under twenty miles. It is fast becoming a problem for astronomers to calculate orbits for all the tiny asteroids that are now being discovered so rapidly, but it is never known when an object of exceptional interest may be discovered. (Continued on page 451)

To Polaris

By MAUDE LUDINGTON CAIN

A million million light years out of night;
Ten thousand ships straight cleaving through the sea—
Neither iconoclast or eremite
Has changed by one slight ray your certainty.

To you, the doubts of mortal men like me
Are less than mists of some Athenian dawn,
You were before we came; and you will be
A million million years when we are gone.

Camera Trails

By EDNA HOFFMAN EVANS

IT IS one thing to preach and another thing to practice what you are preaching, as I have found out rather often. During nearly four years of "Camera Trails" writing I have repeatedly stressed the necessity for a Nature photographer to be ready and able at all times to take pictures. He has to be ready because few of his pictures can be scheduled and arranged for ahead of time. Some of them cannot even be anticipated.

Not that I recommend taking a camera to church, or wearing it around one's neck continuously. But I do think that when a camera fan is in territory where he is apt to find subjects, be that territory ever so familiar, he should be ready to take pictures when the possibilities appear.

And then I went and did the very thing I have been preaching against!

In all my years in Florida I had never seen a white pelican, except one some so-and-so had shot and the corpse was brought to me for some reason or other. (I think I was supposed to stuff it.) From time to time I heard people report seeing flocks of a dozen or so of the great white birds, but I always put that down to optical illusions. After all, brown pelicans do look almost white when the sun hits their feathers just right. White Pelicans in Florida? I had never seen them so there could not be any!

So one August afternoon, when three of us rented an outboard at Pass-A-Grille and started out to take a look at Shell Island, I left the camera in the car. After all, even though I had been away from those parts for a year or more, I felt there was scarcely a palm tree, a grain of sand, or even a wave crest that I had not already photographed. Why lug the Graflex along — it was heavy and the sun was hot.

Well, to continue the object lesson, when we rounded the point on Shell Island I saw a lot of funny looking lumps on the shore. At that distance they did not look like much of anything. But closer inspection showed those lumps to be individual members of a flock that must have numbered between fifty and a hundred white pelicans.

We putt-putted fairly close and the birds took wing — a beautiful sight with their broad, black-tipped white wings beating against the blue sky and the sun glinting on their feathers. And me with no camera!

As fast as we could, we put about and headed back to the dock. Behind us the birds settled on the beach once more and I had some hopes that we could cover the considerable stretch of water, get the camera, return, and find them still there.

They were, but, upon being disturbed a second time, they did not stay long. All I could do was sit with the out-ranged camera in hand and watch them disappear in long, black-tipped white lines. It was almost roosting time and they were seeking shelter on the more remote keys farther down the coast.

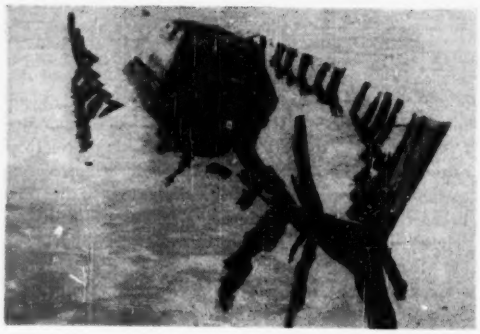
A fishing trip in the same area several weeks later netted exactly nothing in the way of white pelicans, although, needless to say, I had the camera along that time. Once, far in the distance, I saw a flock of birds soaring in great, easy circles against the sky. As they turned in one direction their feathers gleamed white in the sunlight, but whether they were pelicans or not I was unable to say.

And there you have the sad story of the wonderful white pelican pictures I almost got — but did not — because I had left my camera behind.

Anyway, I console myself, it was a sight worth seeing, and never again will I doubt the existence of white pelicans in Florida. The thing that baffles me now is what they were doing there in such numbers.

White pelicans have never been widely reported in Florida. Arthur H. Howell in *Florida Bird Life*, which is the standard reference, lists them as regular winter visitants but questions reports that they breed there. Indeed, their breeding range is given as extending from "Great Slave Lake southward to Southern California, Nevada, Utah, and Manitoba, with an outlying colony on the coast of Texas." Howell adds that non-breeding birds sometimes remain in Florida during the summer. Only once, back in 1881, does he list an observer reporting as many as 200 birds roosting on an East Coast sandbar. Most accounts speak of flocks of twenty-five birds or less.

So, the moral to this sad tale is: Never leave your camera behind when you go into likely territory, even though that territory is almost as familiar as your own back yard. That way you will not miss those opportunities for pictures that happen along when least expected.



This ancient fishing boat skeleton, going to pieces serenely in a neglected backwash, typifies the end of many craft that sail the sea.

FAMILIAR THINGS

Speaking of familiarity with one's own back yard, I believe there are a great many good picture possibilities in familiar or unimportant things that can be too easily overlooked. All it takes is a little imagination and occasionally a little artistic skill in arranging commonplace objects. True, the results may not appeal to everyone; but if they satisfy you, that is the important thing.

Take, for example, the five Panama (also called Lettered Olive and *Oliva sayana*) shells photographed against the weathered wood of an old rowboat seat. The contrasting textures there have always appealed to me — the shiny shells, the "squirmy" animals emerging from them, the moist spots on the board, the rusted nailhead, and the cracked grain of the wood. I like that picture although, for the life of me, I can not tell just why.

Another picture I like is that of the fishing boat skeleton, rotting away in the shallows. There is something about that worm-eaten wreck that appeals to me — from the nearly intact live-bait well to the gaunt ribs projecting above and reflected in the water. Most people who have looked at the picture say "What is it?" But to me there is a combination of romance and everyday hum-drum, of hard work and well earned rest, all to be seen in the picture. It is as though that one wreck typifies all the craft that sail the sea — fishing smack and liner, trim yacht and sturdy tugboat. Eventually nearly all of them end their days like this ancient fishing boat, as rotting hulks with naked ribs, going to pieces serenely in some neglected backwash.

CHRISTMAS CARDS

For those of you who are planning to send photographic Christmas cards this year, it is high time you were getting busy. It takes time to plan and arrange them, and more time to get them ready, whether you do your own printing or take your chosen negative to a commerical printer and let him do the rest.

Since I wrote about them specifically last year at this time, I will not go into detail about photographic Christmas cards so soon again. But whether you pose yourself and family, use one of your most prized scenes or Nature shots, snap the baby or the

There is great contrast of textures in this picture of five Panama shells, ranging from the smooth sheen on the shells to the weather-beaten wood of the background.

pup, or set up an elaborate table-top arrangement, a photographic Christmas card will give a personal touch to those annual Yule and New Year's greetings.

THIS AND THAT

The ninth edition of the *Educators Guide to Free Films* arrived recently. Again edited by Mary Foley Horkheimer and John W. Diffor, and published by the Educators Progress Service, Randolph, Wisconsin, the guide lists 1716 titles of films, 511 more than were listed in any previous edition. Another new feature of the edition is a section on "Improving the Effectiveness of Visual Materials" by John Guy Fowlkes, dean of the School of Education, University of Wisconsin. This is also available in pamphlet form, as I mentioned in last month's section.

Since I believe that visual education is an important part of the teaching and learning processes in our present-day schools — and a highly effective one when properly used — I feel justified in boosting this listing of visual material. It is the best and most complete one I know of, and it is an excellent one for the school that does not have the financial resources to buy or rent the films necessary for an effective program of visual education. True, some of the films listed have a definite commercial slant but, by careful study and selection, a teacher can work out a well-rounded schedule of educational films in a variety of fields.

To mention just two of the new films listed, I would like to see "Your Future in Trees" since it shows forestry from a vocational slant, and "Valiant Years," the story of veterinarians and their accomplishments. Both forestry and veterinary work are good fields for young people, fields that few of them will think about unless guided effectively. A visual education program can be a lot more than just a "picture show" in school, if it is handled right.

While the announcement arrived too late for inclusion in last month's section, when it would have been most timely, I do not want to miss mentioning the ninth annual exhibition of Nature photography, sponsored by the Kentucky Society of Natural History, Louisville. Closing date is November 7, and each entrant is limited to four prints and/or four slides. Entry forms can be obtained from the Society at Box 81, University of Louisville, Louisville 8, Kentucky.

I am afraid the time is too short for Camera Trailsmen who live at any distance to get under the wire as a result of this announcement; but for those living in the vicinity of Louisville, the exhibit may be viewed November 21 through December 5 in the public library.

With wintry months ahead, the chances are that most photographers in cold climes will be doing more indoor than outdoor picture taking. For that reason Eastman's announcement of a new indoor-type color roll film is particularly timely. The new film is called Kodacolor Type A, and according to reports it is intended to provide properly balanced color prints when exposed to either flood or clear flash illumination. Heretofore, Kodacolor roll film, intended to produce color prints for album purposes, has been available only for picture taking in brilliant sunlight or with blue flash bulbs. The new film requires no filter for indoor work, but does call for a type A (Wratten No. 85) for sunlight exposures.

And now, like lots of other putter-offs, I have to get busy on a picture for my own Christmas cards. Here is wishing you luck with yours.

Roadside Pictures

A set of mounted kodachrome slides for use by planning commissions, and by other groups seeking to educate people on the need of roadside control and on the value of rural zoning, has been prepared by the National Roadside Council, 119 East 19th Street, New York 3, N.Y. Full details about this set may be obtained from the Council.

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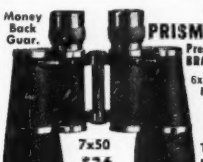

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The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education. The American Nature Association

DOMESTIC BIRDS IN THE SCHOOL ROOM

THE first school room that I ever visited in my life was a bright, sunshiny room where a crowd of strange youngsters drove me in fear to the protection of my mother's skirts. I remember a kindly young woman who came and quietly led me to a corner of the room where there was a golden wired cage in which a little yellow bird sang incessantly at the top of its lungs. The young lady got me so interested in the bird that I forgot my natural bashfulness, and before I knew it I was trying to touch goldfish that swam behind the protective glass of an aquarium, and smell of some flowers that bloomed in pots on the window-sill.

It has been a long time since I have visited a school room where a canary sang at will. I have seen more tables bearing graphs indicating changes in human behavior than I have seen tables bearing living plants and animals that might contribute to changing human behavior. To a considerable extent, we have been in the habit of reducing the educative process to mechanistic manipulations rather than giving young folks the chance to grow naturally. True, the progressive system has changed greatly the disciplines that had become the pattern in many schools, and we know that no true happiness can come from complete freedom any more than it can come from the total adoption of impersonal ritual. I rather wish we could put a few more birds in our school room, in spite of President Truman's expressed desire that there be fewer Byrds in the United States Senate. I rather think that both kinds have demonstrated their worth, and are worthy of protection and encouragement.

There are those, myself included, who feel that the role of birds in the general scheme of things can best be attained by an appreciation of their problems as they may be observed while the birds are free in their natural environment. But no one can deny that there are some things that may be learned better from a bird in the hand than from a bird that escapes into a bush at the slightest provocation. Just as we may learn something from the indoor laboratory about physics, chemistry and the biological sciences, so we can learn something from birds in the same setting. Children who have learned to assume reasonable responsibility for something they have seen fit to confine certainly have learned something that a child cannot learn without the assumption of some responsibility.

The bird in the cage, whether it is a canary, a parrot, or a duck, and whether the cage appears to be of gold or of old slats, has something to offer of importance. It must eat and drink, and what it eats or drinks, or fails to eat or drink, is reflected in its subsequent behavior. Properly fed it may sing; improperly fed it may droop and die. It must be kept clean, and must, in some part at least, contribute to its own cleanliness. There is more reality to a lesson in health and sanitation if a child has cleaned up the bottom of a bird cage than if he has merely read about it. There are evidences of the emotional state of a captive bird that are worthy of study, and there are dangers of faulty interpretations, which must be avoided if the most is made of the relationship between a captive bird and a student studying Nature indoors. What is the hearing range of the captive? What selectivity does it demonstrate in eating? Is it wasteful of food? Does the color of food affect the degree to which different foods seem to be preferred? Do birds show any evidence that they use a sense of smell in connection with their feeding habits? Do birds that are cage birds resemble each other in the ways in which they hold food in the process of eating it? Are they equal in their ability to break food that may be enclosed in hard coverings? These are but a few of the many questions that may be used to stimulate worthwhile observations of captive birds.

Not a few captive birds are hosts to a great variety of parasites, such as lice, mites and so on. Is there any evidence that these parasites show specific preference for different kinds of hosts? Will a chicken louse adjust itself to a canary, or will a water-loving duck have parasites similar to those found on a high-flying pigeon? May all of these be destroyed by similar methods, and does their abundance seem to have any effect on the exuberance of the bird in the cage?

Not a few birds that submit to life in cages show some evidence that they may be taught tricks. Mynahs, parrots and lovebirds may make sounds that resemble human speech. If the bird is not rewarded in some way for making these sounds, does it continue to make them, or does it learn to repeat more quickly those sounds the use of which brings some reward?

The degree to which cage and captive birds submit to the selection of mates by man varies greatly. A swan whose mate may be killed may stop eating and die, but common mallards may present living examples of the worst kind of promiscuity. Do different individuals of a given species vary in the degree to which they show loyalty to a mate? Do the different species, and the individuals of different species, resemble each other in the defense they make of their mates, their young, their nests, or their own privacy? Do they all use similar means of defense in these matters — that is, do some use beaks; others use wings; still others use claws or a threatening attitude expressed through voice or pose or attack? Do any captive birds use the technique, so commonly found in wild birds, of trying to lead intruders from the young or the nest by appearing to be in distress and inviting attack elsewhere than where helpless young or eggs may be found?

The geography of the origin of commonly confined birds should find its place in the school. Where, for example, are the Hartz Mountains from which certain canaries have come? Which parrots are from South America and which from Australia or other areas? How closely do the domesticated forms resemble the native wild forms, and how greatly do they differ? When was a given breed introduced from one part of the world to another? For example, read in the accompanying chart section of the special insert in this magazine about how guinea fowl were introduced into the so-called civilized parts of the world, vanished and then were introduced again. Do not overlook the legal aspects tied up with the importation of parrots, and the reasons why such importations into the United States have of necessity been stopped.

History, English, art — all may find significant relationships with the different birds that we have seen fit to attempt to domesticate or confine. Important in at least one of these fields should be recognition of the fact that in America we have seen fit to make it illegal to keep most of our native birds in confinement, no matter how beautiful their feathers or their songs may be. Such conditions do not prevail in all parts of the world, nor are the captors of birds equally considerate of their obvious feelings. The way we often treat poultry during shipment from place to place may give some of us pause before we proceed too blithely to criticize those who live in other lands.

These are only a few of the many points of interest that may be introduced for the study of captive birds. Certainly, the teacher who sees fit to keep a bird captive for the profit of classroom students owes it to both pupil and bird to assure that the investigation go farther than merely naming the bird and commenting on its beauty, or its particular value to our human society.

Sierra Bulletin

Once a year the regular issue of the *Sierra Club Bulletin* comes out in vastly expanded form, rich in article material and outstanding pictures. The June, 1949, issue is the large issue for this year, and a treat to all lovers of the outdoors, the wilderness and the high places. "On a Wilderness Trail" is the opening essay by Charlotte E. Mauk, and is itself worth the price of this issue. Harold C. Bradley and David R. Brower collaborate to provide a valuable discussion of "Roads in the National Parks," and Francis P. Farquhar's article, "The Exploration and First Ascents of Mount McKinley," is important. Indeed, the entire issue is splendid, and a group of pictures, collected under the title "Sierra Shorelines" and the product of the camera magic of Cedric Wright, are superlative. Copies of this issue are available at $1.00 from The Sierra Club, 2061 Center Street, Berkeley, 4, California.

For Herpetologists

Word comes from Chapman Grant that he is still carrying on with the magazine *Herpetologica*, the organ of the Herpetologists League, and that it is almost but not quite self-supporting. Anyone interested in reptiles and amphibians, and possessed of three dollars, can join the League and get the magazine. Chapman Grant's address is 2970 Sixth Avenue, San Diego 3, California.

Plant and Animal Geography

Plant and Animal Geography. By Marion I. Newbigin. New York. 1949. E. P. Dutton and Co. 298 pages, with 39 illustrations and maps. $5.00.

Approaching the subject from the point of view of the geographer rather than the biologist, this book considers the relation between living things, both plant and animal, and the land that they inhabit. It is, in other words, a bio-geography covering the terrestrial plant cover and its significance; the elements of plant and animal classification; the influence of soils, climatic factors, and the effect of changes of climate on vegetable and animal life. Chapters are devoted to the major types of plant communities and associated fauna, adaptive modifications of animal life, distribution and factors limiting range, and ecological relationships.

Seek Scarlet Ibis

With the goal of studying the habits of and photographing the scarlet ibis, Dr. Paul A. Zahl, New York biologist and ornithologist has gone to the Venezuelan State of Apure, according to an announcement of the National Geographic Society. This spectacular yet rare bird is reported to nest in the flooded llanos of this region, in company with herons, other species of ibis, and, possibly, spoonbills. Destruction of large numbers of these birds for their plumage has reduced them to inaccessible areas and their life secrets are not established.

Yankee Poetry

Yankee Boundaries. By Harry Elmore Hurd. New York. 1949. The John Day Company. 169 pages. $2.50.

As a fellow Yankee, we take particular pleasure in reviewing Harry Hurd's latest collected verse under the title of *Yankee Boundaries.* We, too, . . .

". . . love this soil where even weeds
Grow beautifully as goldenrod
Or chicory, and faith in God
Is adamant as are the hills
From whose aloofness summer spills
The grace of rain upon the land
Where whispering rows of cornstalks stand
In fertile valleys . . ."

These lines are from the second poem in this collection, a poem bearing the title "This Is My Country." We could go on quoting nostalgic lines from other poems, or lines that breathe of New England's hills and "pinelands greening to the tide." We have published poems by Harry Hurd in *Nature Magazine* — too few, perhaps, — and three of these appear in this collection. To any New Englander, wherever he may now be; to any lover of the countryside, these poems must inevitably appeal. Their sincerity, their faithfulness to the Yankee Boundaries, their inherent music, and their wise imagination, make these verses something to treasure. R.W.W.

Lethal DDT

From K. Elizabeth Wingert of Fayetteville, Pa., comes a first-hand report on the effects of DDT. Two cats and two kittens lived in the cellar, promoting an excess of fleas. Spraying with five percent DDT was carried on by Miss Wingert's father. Soon one kitten grew listless, refused to eat and disappeared to die under a lilac bush. The second kitten, stronger but beginning to fail, was taken to a veterinarian, who observed of DDT that "the stuff shouldn't be on the market." By careful diet the kitten was saved but never fully regained its strength. Miss Wingert's father was affected and went on a diet prescribed by a doctor. Daily the evidence grows indicating how unwise it is to accept spectacular developments of this sort without thorough study of the effects of the chemicals.

British Flowers

The Floral Year. By L. J. F. Brimble. New York. 1949. The Macmillan Company. 622 pages. Illustrated in color and black and white. $8.50.

Treating them by season and environment, the author of this book introduces the flowers of the British countryside in detail. It is a thorough guide to the successive pageant of British flowers from month to month.

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STEPPING STONES

By Ruth A. Dodge
President, National Association of Biology Teachers

Naturalists — we need you! As teachers of biology we find so many open spaces in the minds of the young people. We need you to help fill them with Nature lore; with the love and knowledge of the out-of-doors, and with a keen sense of curiosity that will lead to a life-long interest in their own surroundings. There are many of you who, aside from the usual vocations, have become outstanding authorities in your own fields. Why not share your knowledge and experience with the young folk of your town? Then, as biologists and as classroom teachers, we can help to weave the brightly colored threads from your fields of special interest into a tapestry of intrinsic value and beautiful design.

The world is too vast, space is too great, living things are too numerous to comprehend all in one lifetime. We stand in awe of them, and far too many of us remain held fast to a mountain top, with heads befogged in clouds of mist, or bogged down in a dismal swamp, bewildered by the complexity of even life itself.

Stepping stones are what we need — landing places to pause and rest, *guiding stones* along the pathways to higher levels of learning and *precious stones* for the gardens of our lives and homes. Many of these, your talents, lie hidden; are unseen; unknown.

Landing places. These may be the bits of Nature study offered to children on the playground, in the classroom, as club activities, in neighborhood groups. You who are a lover of birds will have children sitting by your bird bath, gazing at your feeding stations, bringing you their birdhouses. You who wade along the shores of lakes and ponds and streams can bring a richness to any science classroom with your untold knowledge. What elementary science or high school biology teacher would not be overjoyed with your aid in the enrichment of his course! Each place in the curriculum, each trip to the field, each lecture or talk offers one more landing place to reconnoiter, to gain perspective, to pause and become refreshed.

Pathways and trailways. From the halls of higher learning the more venturesome youth will seek new pathways. You can lead them along the Nature trails and leave your impressions upon them as guiding stones along the way. Nature lovers in Johnstown, New York, have long had the privilege of knowing their dentist as a world authority on rotifers. The high school students recognize the superintendent of buildings as an authority on ferns. Club members in Dobbs Ferry, New York, look forward eagerly to bird walks at the Audubon Nature camp in nearby Connecticut, led by a greenhouse architect. Thus the inspiration gained from these leaders, the experience shared by youth and age, leave indelible pathways in the minds of those who fare forth. You, like them, can place some guiding stones along the trail.

Hidden nooks and garden spots. You can make each field a garden, each hidden nook a precious stone. You can mark each spot with memories of the priceless treasures you have won through the realms of art and music, and through philosophy and poetry. What is more impressive than the church window of Binghamton, New York, portraying Nature's scenes of a fabric of intricate design depicting incidents from Nature. The trailside museums, school museums and animal sanctuaries represent some of the garden spots. Many of you have hidden nooks around your homes where you regain spiritual uplift through communion with Nature. These, your interests and your experiences, you can share with others. We, as biologists, need to gain a broader outlook; our students need a broader background. We, as individuals, need your inspiration to help us in our chosen fields. You can bring enrichment to our classroom, enthusiasm to our clubs and lifelong interests to our people. Each hobby followed becomes a precious stone.

And thus I say to naturalists everywhere, we need you to place the stepping stones where we can pause and rest and delve into the innermost secrets. We hope you feel the need of biologists, too. Let us know what we can do so that we can plan and work together as we all climb toward our ultimate goal.

As President of the National Association of Biology Teachers I extend to you my greetings and best wishes for the year ahead. You are cordially invited to attend any or all of the biology meetings of the conference in New York, December 27-30. In the meantime I shall look forward to news and notes of your hobbies, your trails, your museums and your special interests.

Organic Farm

Humus and The Farmer. By Friend Sykes. Emmaus, Pa. 1949. Rodale Press. 392 pages. Illustrated. $4.50.

This is a book about the operation of a large farm on the Salisbury Plain in England that was reclaimed from a derelict or sub-marginal condition and restored to startling productivity by employment of organic methods of management. Both in general and in detail, it is of interest to anyone working with the soil, not necessarily on as large a scale as the author of this book, which is the latest to issue from the Rodale Press, source of a great deal of material on organic farming.

Animal Weapons

Animal Weapons. By George F. Mason. New York. 1949. William Morrow and Company. 94 pages. Illustrated by the author. $2.00.

This little book explores the field of equipment that various forms of animal life have with which to defend themselves or to attack a natural enemy, or otherwise to carry on in the often complicated world of Nature.

Experiments with Plants

Play with Plants. By Millicent E. Selsam. New York. 1949. William Morrow and Company. 63 pages. Illustrated by James MacDonald. $2.00.

This is one of the Morrow Junior Books describing interesting and sometimes useful experiments with plants that anyone can enjoy.

Botany Exercises

Laboratory and Field Exercises in Botany. By Fred W. Emerson and Lora Mangum Shields. Philadelphia. 1949. The Blakiston Company. 303 pages. Illustrated $2.50.

This work book is at the college level, is designed for use in connection with Emerson's *Basic Botany* or other standard botany text, and has been prepared to reduce lost motion on the part of the student without sacrifice of thoroughness of training. Throughout, training is given in the scientific method of evaluating data collected by members of the class and those taken from other sources.

Evolution

Factors of Evolution. By I. I. Schmalhausen. Philadelphia. 1949. The Blakiston Company. 327 pages. $6.00.

This volume advances the synthetic treatment of evolution starting from a broad base of comparative embryology, comparative anatomy and the mechanics of development. The translation is by Isadore Dordick of Johns Hopkins, and the editing by Theodosius Dobzhansky of Columbia University.

G.I. BIRDMAN ON HONSHU

(Continued from page 443)

a matchless black collar, edged with bluish-gray. I flushed this dove many times afterwards, and the "creaking-door" effect of its flight recalled again our North American mourning dove.

In the service, one's stay in any area is indefinite. After four months on the main island of Honshu, our 49th Fighter Group moved on to Hokkaido, and new bird adventures. When we left, it was very warm in the Tokyo-Yokohama area. The Japanese skylark, identical with the European species, was singing on its courting flight. The males, in their aerial, nuptial display, rose so high on beating wings that they appeared only as tiny specks in the sky at the zenith of their ascent. Then the feathered creature would drop headlong toward earth with the seeming speed of a falling star. Just when you feared that the prospective husband would out-do himself and crash his fragile body into the ground, he would brake his descent with rapid wings and make a perfect landing from a few feet off the ground.

The most beautiful thing was the musical chorus that accompanied this performance. The notes rose and fell, accentuating the ethereal maneuvers of the determined courtier. "Hibari" — the sparrow of the clouds — the Japanese call him. Strangely enough, when the name is broken up into its three parts, rather than losing the original meaning, a brand new and more complete description of the bird is gained. "Hi (meaning sunshine or fire), "ba" (meaning space), "ri" (meaning advantage) combine in a word picture that is both accurate and appropriate. Thus is described a bird that seems to symbolize the very essence of space, and the advantage of being master over such a boundless environment; a bird that appears in all his glory with vitality that warms the soul, as does sunshine; that flies from the earth as swift as a spark bursting into climbing flame. And so, when I remember "hibari," I think of early spring in Japan and this avian acrobat with the fire of the mating instinct burning inside him, as it does in most creatures on the earth at that season of the year when the living world is again awakening from the winter's lethargy.

A NEW SURVEY OF THE HEAVENS

(Continued from page 445)

The asteroid, Eros, probably the most famous of all the asteroids, has been used in determinations of a very accurate value of the distance of the earth from the sun, which is an astronomical unit of great importance.

There have been two theories of the origin of the asteroids. One is that they are fragments of the primitive solar system that never combined to form a major planet, the other that they are the product of a catastrophe, possibly the explosion of a body of considerable size, at about the average distance of the asteroids from the sun, into a number of irregular fragments. This theory, at present, seems to be the more generally favored of the two.

Among all the known asteroids there are many remarkable and interesting individuals and groups. So far, the record for closest approach to the earth is held by Hermes, discovered by Reinmuth at Heidelberg in 1937. It has come within 485,000 miles of the earth. The asteroid Adonis has come within 1,500,000 miles, and the asteroid discovered by Dr. Baade this summer comes within 4,000,000 miles. The most distant of all asteroids, Hidalgo, was also discovered by Dr. Baade, in 1924. It takes 13.7 years to make a trip around the sun. It lies well beyond the orbit of Mars when nearest the sun.

Among the planets, this month, Mercury will be in the morning sky until it comes into superior conjunction with the sun on November 21. It then passes to the evening sky but cannot be seen to advantage at any time this month. Venus is now a beautiful object in the early evening in the southwest. Near the meridian in the far south at sunset it sets in the southwest about two hours later. It will be farthest east of the sun on November 20. Mars is now in the morning sky, rising shortly after midnight to the east of Regulus. It will be interesting for early risers to watch the approach of Mars to Saturn this month. Early in the month Mars rises an hour or more before Saturn. Until near the end of the month Saturn will remain southeast of Mars, with Mars rapidly decreasing the distance. On November 30 the two planets will be in close conjunction with Mars, passing close to Saturn on the north. This will be an interesting phenomenon to observe because of the exceptional nearness of the two planets in angular distance at that time. Jupiter will be in the southwestern evening sky this month. A considerable distance northeast of Venus early in November, it will be much nearer to it by the end of the month.

Gadgets

From the Mall Tool Company, 7740 South Chicago Avenue, Chicago 19, Illinois, comes a release about a new, lightweight tree saw that should be a great boon in pruning tree branches as much as fifteen feet above the ground. It certainly will cut down risks of tumbling off ladders . . . The Mastercraft Trailer Company, Rocky Hill, Connecticut, sends us information about a new "Knock-About" trailer that is relatively inexpensive and appears to be just the thing for campers and tourists who like more or less to camp out on their wanderings.

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NATURE BY SOUND AND TOUCH

(Continued from page 416)

and keys, was by a bright, 11-year old boy who was quite a violinist — Julius Waugh. (A wiz at figures, too. He could multiply figures like 375 by 425 in his head, and get the right answer!) Today Julius is a successful minister.

These letters were written by the children themselves. Beginning in the fourth grade they are taught to use typewriters — the touch system.

To realize how much this institution means to them, and the training it gives them to meet life, one should be there during a class reunion. Blind alumni! Yet happy ones. And such greetings and visits!

I remember the little old lady who was telling about her new home. "Prayer did it," she said simply. "I got so tired of living in other people's homes — of feeling not wanted. For ten years I prayed for a home of my own, and now I have a little house all to myself. I have my flowers and birds. I feed the birds at my windowshelf and I know their songs and call-notes. I can hear the squirrels chattering as they run about my trees. And I like to hear the frogs — those minstrels of the marshes. I teach music at the Oak Ridge school and walk back and forth every day. I listen for new birds on the way and can touch the trunks of loved trees as I pass, and smell the fragrance of flowers in spring. And how I love the smell of fresh ploughed land! No one was ever happier than I am now."

So are these children trained to meet life, to face it and to get the most out of it, to give something to it in return.

After I came to know more about their work and lives I had the feeling that if the blind had a slogan it might well be: "Hail, life! We who are blind salute you — and try to find you to be good!"

EAGLE HARBOR'S DEER CITIZENS

(Continued from page 435)

summer with Bambi she was not seen for the whole day. At twilight, however, we heard an insistent "baa-baa-baa" and there was Bambi with a tiny fawn at her heels. The fawn was bleating like a lamb as she begged her mother for food.

On they came to the kitchen door. Bambi paused to lunch on the leaves of a young apple tree. Then, suddenly, with ears alert, she listened, then ran into the woods, leaving the fawn behind like an abandoned baby on the doorstep. The day-old fawn dashed across the beaten path to a lot covered with tall grasses. There the baby folded its tiny legs and dropped into hiding, a perfect example of instinct and Nature's protective coloring. The instinct for food, however, was also strong, and with darkness the "Baa-baa-baa" began. There was no mother, no food, and the infant was hungry.

Early the following morning neither mother nor infant could be found. A searching party was unsuccessful until the report came that Bambi's baby was deserted, and lying across a juniper bush in a small clearing "sick and helpless and ready to die."

A human foster mother volunteered, and, with a blanket and basket, went off to rescue the fawn. It scarcely moved an eyelid when it was gently placed in the basket. Then followed hours of teaching the little fellow to feed from a bottle. By twilight the news came that little "D" (the initial by which he now was known) was walking about the room and all was well.

On July fifth "D" was in fine fettle. Bambi made her usual visit that morning at the home of "D's" foster mother. She was a little nervous, but otherwise as friendly and confiding as she had always been. The foster mother was determined that the fawn should be returned to the doe if she would accept it. But Bambi gave her deserted child an ugly look and attempted a vicious kick, which settled the question as to where the fawn belonged. This happened on several occasions.

There had been persistent rumors of a fawn and doe seen at various times skirting the village. Bambi had visited us a few times alone since she had left "D" at our door. About the seventh morning after that searching party, up the road she came. Following close at her heels was the other twin, a beautiful fawn, a little larger and stronger than "D." We called him Bino, short for Bambino.

Two days later they came again at the dinner hour and grazed near the Big Lake, about 300 feet from the porch. The two put on a lively show for our dinner guests, prancing, frisking, and leaping over the bushes and grasses. When they reached the house, after their antics, Bambi was as gracious and friendly as she had ever been, but Bino would not accept his mother's friends. Later Bino came near the cottage door with his mother, but accepted neither friendship nor tidbits from our hands.

"D" grew daily in grace and wisdom and endeared himself to all with whom he came in contact. He became an intelligent and exacting little rascal. His foster mother gave him his bottle day and night at regular hours. But when she overslept and missed by a short time that seven a.m. hour, "D" kicked the door between the kitchen and his storm shed apartment until he heard her come downstairs.

Little "D" and his foster mother became great friends. Each night at ten o'clock he would come to the front door, rattling the latch until let in for his nightly tidbit. Once, when Bambi and Bino strolled toward the house, "D" saw them and rushed out of the yard to meet them. They immediately turned tail and galloped off, "D" following as fast as he could through the village. When he found he could not join them, he turned back, tired and forlorn. Up the front steps he went, rattled the latch, and when his foster mother opened the door, he walked straight through to the kitchen, stood on his hind legs in front of the sink and tried to get a drink. He was thirsty from his long run. His foster mother soothed his wounded feelings with a piece of chocolate cake.

"D" now has regular meals other than from his bottle. He loves a slice of tomato, or of lemon, or even more, a wedge of chocolate cake. When given these foods he makes funny little noises as if to say, "M-u-m-m, but that's good," and asks for more.

During the winter months "D" (who turned out to be she) learned to care for her own feeding. When we joined the summer colony at Eagle Harbor for 1949 we learned that Bambi was expecting fawns. Bino also turned out to be more friendly.

The deer had taken up residence in an area that gave them water, cover and space. In mid-June Bambi's fawns arrived, twins and females. Guarding them, she drove off both Bino and "D," the former unable to understand his mother's attitude. For ten days Bambi kept the babies in hiding, then brought them out, and soon all five deer were great friends and welcomed citizens of Eagle Harbor.

Smart Frog

From Bill Raub of San Jose, California, comes a report of a Nature incident that he and his companions, Bud Chinn and DeWitt Portal witnessed. They visited a series of trout ponds made by earth dams through which was a pipe outlet, the pipe being about four inches in diameter. They saw some chubs, about one to two inches long, trying to jump up the fall of water from the pipe mouth and into the pipe. They were not doing well at this, a fact that a large frog was using to his advantage. Stationed on a rock below the pipe, the frog tried for each falling fish, and got his share while the boys watched.

Friendly Land

Make Friends with Your Land. By Leonard Wickenden. New York. 1949. The Devin-Adair Company. 132 pages. $2.50.

Leonard Wickenden is a chemist, and one who looked with much scepticism at the theories and contentions of the proponents of organic agriculture. Being a scientist, however, he experimented, first in his suburban garden and then on his Connecticut farm. He became an enthusiast, and his studies revealed the manner in which organic matter and the microscopic life of the soil cooperate. This book makes interesting reading for any gardener or agriculturist, and it has, in addition, the suspense of discovery.

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Under the Microscope

By JULIAN D. CORRINGTON

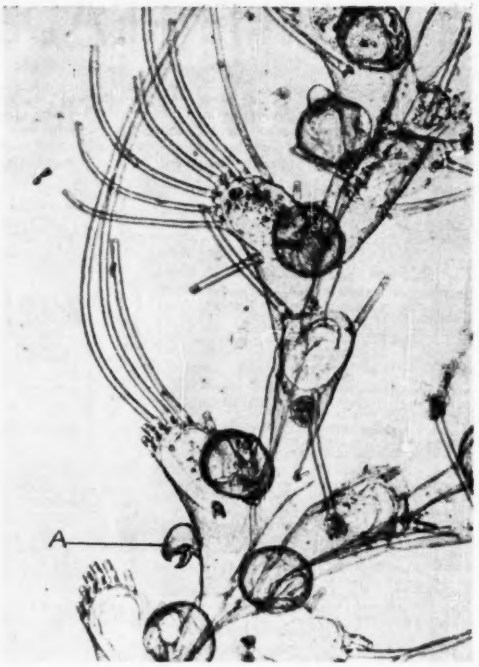
SEA MOSSES

THE amateur naturalist at the seashore expects the unexpected. There is always the possibility of something new — even rare — among the drifting and floating objects, or the accumulated rubble of the strand. One moonlit night, the horseshoe crabs are present in enormous numbers; next day they are gone, but the beachcomber finds many Portuguese men-o'-war or whelk egg cases cast up by the receding tide. In all likelihood he has never even heard of the sea mosses and sea mats, abundant creatures, but generally known only to the professional; indeed, he must use a microscope if he would see anything of interest or learn some of the ways of these, in many respects, the strangest of all animals.

If you were to read an account by a modern Jonathan Swift, of a particular voyage by a Gulliver in which the great traveler claimed to encounter animals that periodically shed all of their viscera and soft parts and then regenerated these organs, you would smile and think — how absurd! If then these same animals were said to employ disembodied bird's heads to snap at offending trespassers, your indignation would mount at the temerity of an author who could fabricate such palpable nonsense. And if this Gulliver further stated that these animals reproduced by internal budding, the offspring taking form when released by the death and disintegration of the parent's body, you would judge the author to have completely overstepped the bounds of credible fantasy — that is, unless you knew about the bryozoans!

Along our coasts are myriads of tiny animals living in dense colonies that form leafy or bushy branching masses in deeper water, or that encrust rocks, piles, wharves, seaweeds, shells, and other animals in the shallows, much after the general fashion of sponges, corals, and barnacles. Other species inhabit similar situations in freshwater lake or river, pond or brook. The remains of those that have secreted limestone masses are abundant and important fossils, known from the Cambrian to the present.

Moss Animals is as good a name as any, and reflects the fact that they were long thought to be a form of sea plant, as was true



***Bicellariella ciliata*, 80X, polypary only. Avicularium at A. From Max Poser collection, slide made by A. C. Baker. London, 1910.**

of other attached or inactive animals of the ocean. It also describes the appearance of some, as the widely-studied *Bugula*, whereas Sea Mat applies more particularly to an encrusting type, as *Membranipora*. Coralline is still another name, used for those with stony houses. For many years in animal classification they were put into that catchall for sedentary colonial groups, the Zoophyta (animal-plants), but their true nature as organisms considerably higher than the coelenterate polyps has been known since 1830, when J. V. Thompson separated them under the name Polyzoa (many-animals) referring to the large number of individuals in certain colonies. This name is still favored in England. The next year, Ehrenberg likewise held them to be distinct but dubbed them the Bryozoa (moss-animals), the appellation more commonly employed on the Continent and in America.

In our own day it has been customary to group the moss animals with the brachiopods, and usually with the phoronids also, to comprise the Phylum Molluscoidea (mollusk-like). None of these creatures are known to the public as a rule. More recently the tendency has been to separate the bryozoans as a distinct phylum; actually their resemblance to the brachiopods is slight.

An individual bryozoan animal is termed a *zooid*, the colony a *zoarium*. Each zooid consists of two main parts, an outer casing, the *zooecium* (animal-house) and the inner, fleshy, living organism, the *polypide*. The zooecium may be gelatinous, membraneous, chitinous, or calcareous, and may take the form of a sac or a tube. It may or may not have an *operculum* or lid, membraneous or chitinous. Zooecia may remain behind after the death of the polypides, and a mass of such empty zooecia constitutes a *polypary*.

The digestive tract is complete and U-shaped, the *mouth* being

***Lophopus cristallinus*, 30X, freshwater bryozoan, showing extended polypides. Slide by H. C. Codding, 1910, Poser collection, fluid mount.**

located in the center of a circlet of tentacles, superficially like the condition in hydroids and anemones. The mouth leads into an *esophagus* and thence to a *stomach*, from which point the tube doubles back as an *intestine* and opens at the *anus*, located near the mouth, somewhat as in ascidians. The *tentacles* or arms are slender, hollow, and ciliated, and rise from a ridge termed the *lophophore* (tuft-bearer), which may be circular, oval, or horseshoe shaped. This structure, or something like it, occurs also in the brachiopods and phoronideans.

Beneath the non-living case of the zooecium and closely applied to it is a very thin *body wall*. This is composed of an ectodermal epithelial sheet that secretes the zooecium, and a mesodermal epithelial sheet that constitutes a *parietal peritoneum*. The alimentary tract is lined with entodermal epithelium on the inside and a thin mesodermal epithelial layer on the outside, the *visceral peritoneum*. Between these two walls is a capacious body cavity or *coelom*, filled with fluid. This construction of a tube-within-a-tube, with three germ layers (triploblastic estate), a complete digestive tube, and a coelom, is characteristic of the higher phyla of animals and is very different from the corresponding architecture of polyps, with their single tube, two germ layers (diploblastic), incomplete digestive tube, and absence of a coelom.

A feature of the coelom is that from its walls the germ cells arise, and this is found to be the case in the bryozoa: *testes* generally occur on the *funiculus*, a strand of mesodermal tissue running from the bottom of the stomach — where the U-shaped gut turns upward — to the base of the zooecium; the *ovary* grows from the body wall, most moss animals being hermaphroditic. A few are unisexual.

When *parietal muscles*, of the mesoderm of the body wall, contract they bring pressure upon the coelomic fluid which, being incompressible, transfers the force to the polypide. Something has to give, so the polypide is extruded from the zooecium. A *retractor muscle*, running from polypide to body wall, pulls the animal back into its case. Bryozoans are among the most exasperating as well as interesting of the small animals one studies in a fingerbowl of water. The polypides protrude with maddening slowness, and the slightest jarring or disturbance sends them back into their zooecia with lightning speed, whereupon the slow-motion emergence begins all over again, at a pace by comparison with which a snail would positively whiz!

Bryozoa have a central nervous system, simple though it may be. There is a single *ganglion*, sometimes referred to as the brain, located between mouth and anus, and from this numerous nerves ramify, especially to the tentacles. There are no sense organs nor any vascular system and, strangest of all, no trace of an excretory system of any kind. In marine species the entire polypide — all living tissues save the body wall — periodically disintegrates and forms a roundish mass known as a *brown body*. When the body wall cells later regenerate a new polypide, the brown body often comes to lie within the stomach and is then expelled through the anus. Formerly, this entire performance, one of the strangest known in the living world, was interpreted as a means of excreting:—when the bodily organs became clogged with excretions, in the absence of any system to care for this urgent function, they were shed, as a tree does its leaves. Many zoologists today believe that this is not the true explanation, but have no alternative to offer. As for excretion, it is felt that the thin cell layers can excrete directly into the coelom, without the necessity of either an excretory or a vascular system.

By *polymorphism* is meant that condition in which several forms of the same species occur, irrespective of sex, as is perhaps best known in termites, bees, and ants where, in addition to males and females, there are such castes as workers, nurses, and soldiers. This fascinating biological phenomenon is still more remarkably illustrated by coelenterates and bryozoans. Individual moss animals that are highly modified for special purposes are the avicularia, vibracula, and ovicells.

The *avicularium* (little-bird) is very well named as it reminds one immediately of a bird's head. An example is seen in our illustration of *Bicellariella*, at *A*. They may be stalked (pedunculate) or not (sessile). That part corresponding to the cranium of a real bird's head is the *chamber*, the upper jaw is the *beak*, the lower jaw the *mandible*, a modified operculum. As in an actual head, only the mandible moves, snapping up and down like the jaw of an angry animal. There are strongly developed muscles for both motions, the *occlusor* to close, the *divaricator* to open. In the most primitive cases, this apparatus encloses a functional polypide and occupies a place in the colony similar to that of unmodified zooids; but in advanced types all semblance to other zooids is lost. Then the avicularium contains no structures looking anything at all like those of a regular polypide and is, instead, a small appendage of some other zooid, located near the orifice of the zooecium. Here it will snap at any foreign organism that approaches. Most investigators believe that its function is defensive: to kill or turn away small animals that might attack the polypides and, more especially, to keep off larvae that would settle upon the zoarium and grow so as to encrust and eventually smother the bryozoans. There are modified individuals (dactylozooids) in some of the complex hydrozoan colonies and curious organs (pedicellariae) on the skin of starfishes and sea urchins that ward off enemies and trespassers.

Some students of the bryozoa also feel that the avicularia aid in food capture.

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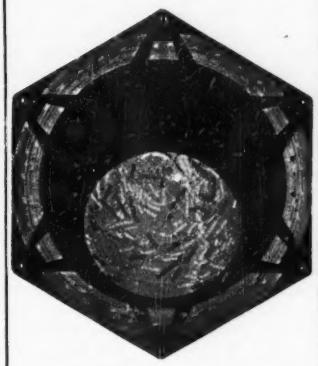

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In feeding, the polypide slowly emerges, spreading its tentacles; their cilia create currents that drive food particles toward the mouth and cilia in the digestive tract continue this flow through the animal. Microscopic food particles are entrapped by mucus on the inner sides of the tentacles, and thence carried into the mouth. These feeding habits are similar on the one hand to that of rotifers and on the other to amphioxus. Plankton, organic debris,—anything small enough is fair game. It has been suggested that the avicularia may seize and hold small worms and crustaceans until they die and decompose, thus manufacturing small enough food particles and contributing the attendant bacteria as part of the menu of the adjacent polypide.

Still more highly modified, along the line of apparent extreme simplification of structure, but acting in a manner to belie such an opinion, is the *vibraculum*. This is an individual, the polypide of which is extended into a long, slender whiplash or bristle-like structure which vibrates or sweeps back and forth over the surface and keeps off encroaching organisms. Presumably these have been derived from prolongations of the mandible of ancestral avicularia.

A third form of individual is the *ooecium* (egg-house) or *ovicell*, a brood chamber that develops in many species to house the embryos. In *Bicellariella* (illustrated) ovicells are located at the upper ends of the cornucopia-shaped zooecia. Commonly, in bryozoans, sperms fertilize eggs in the body cavity, where each egg develops to a larval stage resembling a trochophore, which escapes either through a birth pore or because of dissolution of the parent body. In other bryozoa, the eggs migrate into ovicells and undergo embryonic fission, each egg producing several larvae. In typical freshwater moss animals, the egg remains in the ovary, where it develops but does not go through a larva stage. This group forms internal buds, *statoblasts*, on the funiculus, and these winter over or survive a period of drought and reproduce the colony when released by death and disintegration of the parent, thus recalling the gemmules of freshwater sponges. Some of these sink to the bottom when released, others have floats, still others both floats and hooks. We shall devote a separate article to statoblasts one of these days, as they constitute a group of objects for the microscope of much interest.

Most species reproduce asexually by a regulation external budding. The embryo or larva, produced sexually, attaches and becomes the first zooid of a future zoarium, then proceeding to bud off daughter polypides as well as secreting the *ancestrula* or first zooecium.

The Phylum Bryozoa is customarily divided into two classes, the Entoprocta (Endoprocta) and Ectoprocta. Practically everything we have said thus far applies only to the last-named class, and the opinion is often expressed that the two so-called classes are actually so different and so remotely related that they had better be considered as separate phyla.

The Entoprocta (inside-anus) includes a small number of minute forms in which the anus opens inside the lophophore, which is circular. The tentacles cannot be retracted, but can be covered by a fold of the body wall that has its own sphincter muscle. The animal consists of a *calyx* or "head" containing the viscera, and a *stalk*. One family is solitary in habit, the other two colonial, with a few individuals rising from a disc, or with a number attached to a creeping stolon, like strawberry plants on a runner. A primitive excretory system in the form of a pair of nephridia (kidney tubes) ending in flame cells is present, and there is no coelom. Both freshwater and marine, bisexual and hermaphroditic species occur.

In the Ectoprocta, the anus opens outside the lophophore, which is retractile and either circular (Order Gymnolaemata — naked-throat — referring to the absence of an epistome) or oval or horseshoe shaped (Order Phylactolaemata — guarded-throat — with an epistome). The former are mostly marine, the latter wholly freshwater. Some of these freshwater species can creep about over the floor of the area where they dwell.

Only about three thousand species of bryozoa are known and it is considered a minor phylum. Yet often the individuals are enormously abundant and worldwide in distribution. The trouble to which one must go to make their acquaintance is amply repaid by their amazing performances.

ADVANCED HINTS
Mounting Bryozoa

MARINE bryozoans may be collected from a variety of situations, as algae, rocks, shells, and piling. A colony, or portion of one, may be scraped off and transferred to a dish, as a fingerbowl, and processed at once. If to be held for observations of habits, such as feeding, or for production of larvae, the dish must be hooked up in some way with running sea water. Every aquarium shop now has small, inexpensive aspirator pumps available for such uses.

Freshwater bryozoa are scraped from the undersurfaces of practically all floating or immersed objects, as rocks, logs, lily pads and other aquatic vegetation. Some valuable hints on how to feed a live culture and keep it under observation may be found in *Culture Methods for Invertebrate Animals*, Comstock Publishing Company.

Because of their agility in contracting, bryozoans must be narcotized before they are killed, so that they may be obtained fully expanded. Otherwise, if strongarm methods are employed, all that the microscopist will have for mounting is a zooecium, within which the fully contracted polypide is successfully concealed.

Menthol crystals may be scattered over the surface of the dish of water containing the specimens; allow to act overnight, then apply the fixer in the morning. One percent formic acid, added drop by drop or by means of a capillary or string siphon, will narcotize and kill the animals effectively. Still other reagents recommended by technicians include alcohol, ether, chloroform, chloretone, cocaine, chloral hydrate, hydrogen peroxide, and nicotine. They are all useful, though some are expensive, some dangerous in the hands of a novice, and some require authorization to purchase. Perhaps cheapest and best is ordinary Epsom salts, widely used to expand all soft aquatic animals. Sprinkle a pinch of the salt over the water of the dish, and follow with additional pinches — at five minute intervals, for example — until the creatures no longer respond to stimuli, then drain or pipette off the Epsom salt solution and replace with the fixer.

Solutions containing bichloride of mercury have been favored as a fixing fluid in this group. Bichloride-acetic is 100 parts of a saturated solution of bichloride in distilled water and 10 parts glacial acetic acid. Schaudinn's fluid is 2 parts of this same solution of bichloride to 1 of 95% alcohol. To 100 parts of this combination, add 5 parts glacial acetic acid just before using. With either of these reagents, fix for over night and wash for four to six hours in running water the next day. Worcester's fluid is also very good, — a saturated solution of bichloride in 10% formalin. Fix over night and wash for four to six hours in 5% formalin.

Cautions: bichloride is, as is well known, extremely poisonous and must be handled with due regard to one's desire to be among those present. Wash the hands thoroughly after using this chemical, and don't neglect the fingernails! A horn or glass spoon must be used with bichloride, as it corrodes metals badly. To the 70% alcohol used in subsequent dehydration, add sufficient iodine solution as to give the alcohol a port wine color. This is to prevent the fouling of the preparation with a multitude of black crystals, mercury "pins." Allow to act over night, then change to fresh 70% alcohol for a like period before resuming dehydration.

Stain specimens with alum cochineal, Bismarck brown, crystal violet, Delafield's hematoxylin, fast green, or picric acid. Use cover glass props or mounting cells as the thickness of the specimens dictates. For a method of preserving whole specimens of freshwater bryozoans, see *Histological Technique*, Kingsbury and Johannsen, section 283.

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